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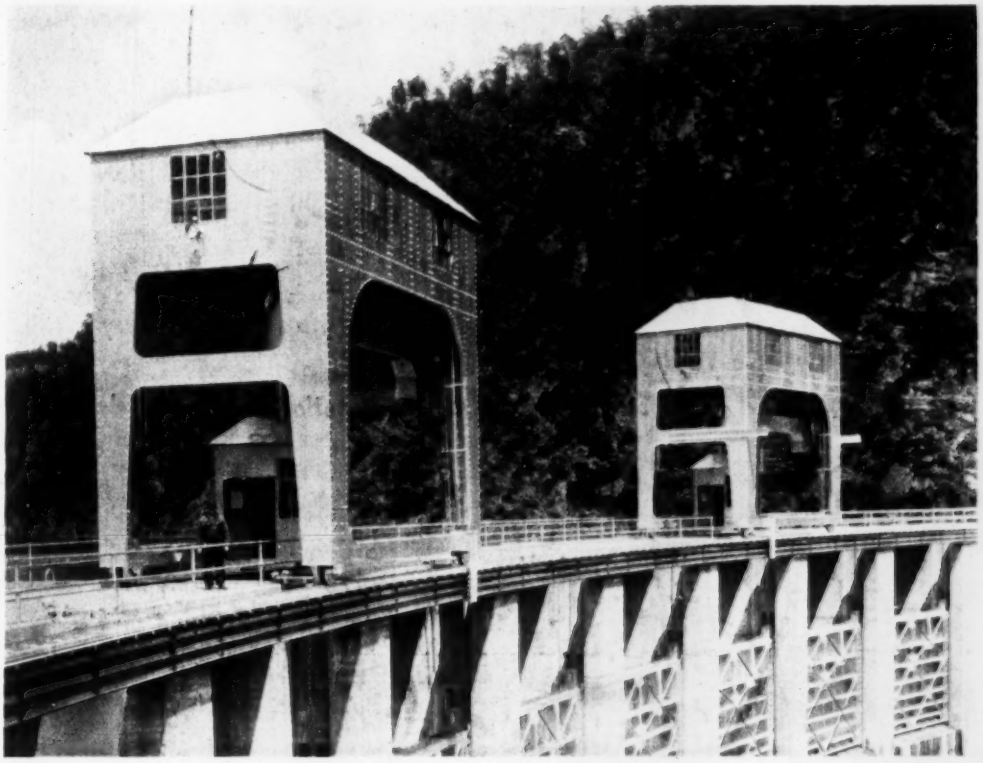

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May 7, 1931

Gate Handling at Calderwood Dam

Transport Building at Chicago World's Fair

Weather Effect on Water Demand in Wisconsin

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, MAY 7, 1931 Number 19

New Water Law

BY THE Supreme Court's decision in the Delaware River case the way is cleared for a quick start on an urgent public supply undertaking. New York City needs additional water, and being now authorized by the decision to go ahead it will push construction without delay. This prospect, coming just at this time, ought to help strengthen business confidence, by opening up more work and sweeping away some of the fog of doubtful legal rights that has helped to cloud the horizon. More fundamentally, however, the decision is important because it erects a workable water law on the shreds and remnants of medieval doctrine, the legal débris on which New Jersey tried to support its amazing claim to exclusive right to the Delaware—it being the lowest abutter. The Delaware and the Connecticut decisions jointly establish equitable rights as the basic rule of interstate water law. They remove the possibility of many strike suits by public authorities. More rational disposition of interstate waters will be possible henceforth. The decision also gives an impetus to the adoption of equitable interstate agreements on water apportionment, such agreements as were twice drafted by commissions of Pennsylvania, New York and New Jersey but were twice rejected by the latter state.

By Main Strength

AFTER more than a year of increasing business depression, organized business had its opportunity at last week's meeting of the Chamber of Commerce of the United States to grapple with the problem and lay the basis for its solution. The opportunity was not taken. The meeting accomplished little or nothing toward solving the problem, and indeed it did not even attempt to discuss the problem. There were interesting papers on mass transportation in cities, insurance requirements, the retailer's function, employment stabilization, and the like. But there was nothing that entered directly into such fundamental troubles of the day as credit collapse, bank failures, factory shutdowns, general rewriting of values, shrinkage of demand and unbalanced production, or price wars. We thus see that, while the country is struggling in the undertow, the Chamber prefers to ignore the situation. It could have centered the keenest joint thought of industry and finance, and their ablest cooperative effort, on the objective of doing away with the breadlines and making them forever impossible. It failed to do so; and this is a failure in leadership, bringing back Kipling's biting word of the "flanneled fools at the wickets and muddled oafs at the goals." But there is one invigorating conclusion: The task of rebuilding prosperity is definitely in the hands of the individual. He need not count on help from the general organization of business, but must succeed by main strength—his own confidence, judgment and business sense applied to his own work and to the separate small industrial group of which he is part.

Association Service

OUT of the Chamber of Commerce turmoil the industrial association emerges even more definitely as a necessary and vital working unit. It is the expression of the combined interest of a small interrelated group, whether of brickmakers, of steel workers, of cement manufacturers or whatnot. In each of these groups the individual business is only a fragment; its prosperity, even its good repute, depends on that of its business colleagues and competitors, and if it would survive it must work with them. Recent times have developed uncertainty and hesitancy about continuing the work of these associations, and only a month ago we spoke of the hazard of loss of strength to which some of them are exposed ("Crossroads of Industry," April 2, p. 549). In the light of current developments the industrial association stands forth as the one agency which, aided by and supporting the solid good sense of the individual, is able to cope with the forces of disintegration and destruction. If there is any industry that today can look forward hopefully on a future deprived of the help of a vigorous association, we do not know of it. And by the same token we see no industry that can safely let its association cooperation go to seed.

Construction Volume

ON THE face of the figures construction activity as reflected in our weekly record of contract lettings is unexpectedly low; the four months' total so far is 13 per cent below last year's lettings. But these figures do not represent the true volume of construction, and therefore may mislead unless properly interpreted. Since last year a sharp drop in construction costs has taken place. Bids are abnormally low; like material prices, the quotations on construction work are far below a proper level and far below those prevailing a year ago. Contract bid conditions are so variable that no truly indicative averages for comparison are obtainable. Moreover, cost computations based on normal labor productivities and reasonable profit margins are no guide to current bid figures. Estimates indicate that the decrease below the level of a year ago is in excess of 10 per cent for the average of recent contracts. The reported contract totals should be scaled up accordingly in order to give a true comparison of construction volume. Reckoned in this way the year's contract record is not as disappointing as

it appears, but shows up well alongside of the 1930 record. The corrected volume estimate represents a substantial approximation to the advance estimates.

Engineering by Legislation

WHEN the North Carolina legislature last week passed the second of two acts making mandatory on the state highway commission the paving of certain roads it set a precedent that may readily shift the highway policies of that state from a sound business and engineering basis to one of logrolling politics. Neither project is justified by any traffic that is in sight. Nor are funds available. But in both cases local politicians were able to muster enough strength in the legislature to override the judgment of the commission and its engineers. In other words, the policies of the state highway system, so far as these two projects are concerned, are fixed by the legislature on a purely political basis. When the politicians have once tasted blood, it is easy to see how quickly they will force through local schemes without rhyme or reason so far as engineering is concerned. It is fortunate that the legislature will soon adjourn for two years. But the evil precedent has been set. Unless public sentiment in North Carolina is aroused to the danger of this sort of vicious legislation, it is merely a matter of time until the high standing of that state as one of the leaders in the nation's highway progress will be lost. Moreover, the well-planned state highway system will revert to a mere give-and-take political hodge-podge of local projects.

Railroad Valuation

THE END of years of litigation over railroad valuation is brought measurably nearer by the Interstate Commerce Commission's decision in the Richmond, Fredericksburg & Potomac R.R. valuation case, abstracted in our news pages last week. When the United States Supreme Court disapproved of the commission's findings in the O'Fallon case it did so on the ground that the commission had not given consideration to the cost of reproducing the railroad company's property at the time the valuation was made. However, the court did not say that any fixed weight should be accorded to the cost of reproduction new. In fact, it quite clearly stated that the consideration to be given to that factor in fixing a valuation might be negligible in some instances. In the valuation of the Richmond, Fredericksburg & Potomac R.R. the commission states that both reproduction cost and original cost are reflected in a substantial degree in its findings. Hence the court's requirements appear to have been met. If, as appears likely, this decision is appealed and does meet with the U. S. Supreme Court's approval the commission's work of fixing values upon the property of all the railroads of the country, now held in suspense pending a decision on this point, can be brought up to date.

Better Spillway Gates

DEVELOPMENT of power on flashy rivers always has forced designers of dams to seek ample spillway area for floodflows without undue waste of water during periods of low flow. In the earlier plants this end was obtained through the installation of flashboards upon the crest of spillways. These boards were built to collapse when overtopped or to be tripped manually on the approach of a flood. They were fairly satisfactory but were wasteful of water. In recent years, with increasing need for conservation of water, and with generation of power in narrow gorges where there must be great depth of water over spillways at times of flood, the attention of designers has been concentrated upon the development of rapidly operating crest gates which would pass large quantities of water. In that development, hand-operated sluice gates were followed by mechanically and electrically operated gates which gave greater flexibility, speed and sureness of operation. Among the most recent of such gate installations are those on the Calderwood dam in Tennessee, described in this issue. They are notable as examples of the refinements now resorted to in the design of such gates for hydro-electric power plants in order to get the maximum of efficiency at a minimum cost of operation.

Look Out for the Cars

DANGER to life and limb lurks in the operation of construction railroad systems. The familiar dinkey and string of cars have killed or maimed many a workman. Eternal vigilance on the part of the engine driver and workers on the job can eliminate or at least keep down accidents of persons struck by moving trains. Accidents of three other types are common—those caused by carelessly loaded cars, those caused by derailments, and those occurring in coupling cars. There is no excuse for the poorly loaded car; only grossest carelessness can account for a load so piled that all or part of it is likely to topple off in transit. Poorly laid and maintained track, common because of the temporary nature of construction railways, is to blame for most derailments. Proper track and correct handling of trains will do much toward keeping cars on the rails; and it is pertinent to recall that derailments not only are dangerous but also are costly in lost time. Coupling cars is a dangerous procedure, aggravated by the common use of the archaic link-and-pin or bar couplers. Some day, and it is hoped soon, an enterprising manufacturer will devise a safe and simple car coupling suited for narrow-gage railway equipment. Until then it is well to remember the old warning, "Look out for the cars!"

After Due Deliberation

JUST as the Supreme Court of the United States sometimes reviews one of its decisions, the Port of New York Authority has reviewed its earlier decision to name the Fort Lee bridge "George Washington Memorial Bridge." Every bridge built by the Authority is given a name, like a municipal ferryboat; and, like some such boats, two previous bridges had found godfathers within the official family—Outerbridge and Goethals. But they are of insignificant size in contrast with the imposing magnitude of the Fort Lee bridge. Under these circumstances the Authority did not choose to immortalize another member of the official family, but called upon the Father of his Country as godfather, although less than a mile away there already is a bridge named for him. Hardly had they decided upon this historic and distinguished appellation than protests arose. It was felt by some people that a bridge should be named after the place it reaches. But of course this depends on which end is the traveler's point of departure. Evidently the problem in hand was not at all simple. Therefore the Authority undertook a thorough reconsideration. Now,

after due deliberation, it ratifies its former decision with only slight change. "George Washington Bridge" is the final official name. Thus the Hudson River contributes the tenth, twentieth or perhaps hundredth Washington Bridge in the United States, whatever the true count may be. History may record the name, but in practical life the Fort Lee bridge will have the same experience as the frecklefaced boy whom his parents named Reginald but who went through life as Shorty. It will get its workaday name from the people, while its christen name is likely to remain unknown outside parish records and mortgage papers.

Prepare for Change

PUBLIC roads policy exhibits a definite trend toward spreading expenditures over a broader range of territory, and simultaneously changing to cheaper road types. Quite aside from the political and economic aspects of this movement, it presents a serious problem to highway contracting. At present this industry is organized in the leading roadbuilding states to construct high-type roads. It must readjust its equipment and methods to suit a new class of work.

The outstanding examples of the change in policy are North Carolina and Pennsylvania. Both have been building state systems of hard-surfaced roads, and both are thinning out their road construction to include more secondary mileage. North Carolina by recent legislative action has increased its state road system from 9,000 to 55,000 miles; Pennsylvania is adding 20,000 miles to its present state system of 13,300 miles. Neither state with its greater mileage will have materially greater sources of income for highway construction. It follows necessarily that fewer miles of hard surfacing will be constructed and that the chief work offered to road contractors will be grading and surfacing light-traffic roads: macadam, gravel and traffic-bound earth.

In both states the contracting situation is critical. The construction firms which during a decade have perfected organizations and made large plant investments for building concrete and other high-type roads find themselves compelled to scrap much of their special equipment and training, set up different organizations and invest in new plants. This will be a bitter experience for all and a disastrous undertaking for some. Nevertheless the necessity must be faced.

About the only cheer to be gained from the situation is that it sounds a warning for preparedness. The action of the states named, sudden as it has been and in one instance tied up with political demagogism, is action that may be expected in many states during the next few years. Everywhere the highway contracting industry has to prepare to adjust itself to the new requirements when the change comes. It was caught unexpectedly in Pennsylvania, and was only a little better prepared in North Carolina. To see that this experience is not repeated is the duty of individual contractors and the obligation of their association officers.

Present developments indicate that, contrary to what many had come to believe, public roads policies are not stabilized but are in a state of flux, and may settle down to a condition quite different from that which has existed under the theory of limited state and federal-aid systems. Highway engineering as well as contracting has to be prepared to anticipate whatever change takes place as a result of these developments.

Filter Sand Research

THE symposium on filter sand specifications presented elsewhere in this issue calls attention to one of the many fields of engineering in which design is still largely empirical. If there is any general expression that can be culled from the opinions contributed by a large group of water-works engineers, it is a recognition of the fact that available indices of sand size have limited meaning and that in consequence we do not yet possess a thoroughly rational basis of design. But if we must for the present rely on empiricism, its indefinite continuance will not be justified, and thought should be given to reaching a more satisfactory condition.

Before the selection of filter material can be placed on a rational basis an answer must be found to the question: "What depth of bed and size of grain will give the greatest degree of economy compatible with bacterial efficiency?" But so many factors enter into the answer to this question that the data obtained from direct observation on periods of filter service and quality of effluent would quite likely prove impossible of interpretation except in another empirical manner. Orderly procedure would require that the question be divided into its basic elements, and each kept as simple as possible, even at the risk of making the problem seem impractically academic.

The hydraulics of the case is being ably studied at Harvard University, and therefore we may hope that in the none too distant future designers will be able to predict with a reasonable degree of certitude the loss of head occasioned by the passage of clear water of known temperature through a bed of filter material of given physical characteristics.

In connection with the question of economical depth it becomes necessary to understand the factors entering into the final physical stability of a bed of granular material. Accepting the fact that washing will bring about a distribution of grain sizes such that the finest particles will be at the top and the coarsest at the bottom of the bed, how rapidly can that graduation be accomplished without allowing the smaller particles to fall through the voids below them? In other words, how steep a slope of the grading curve can be allowed under given conditions of upper and lower limits of particle size?

Of more immediate concern are the questions concerning the mechanical action of the filter bed. What is the relation between initial loss of head and its rate of increase? Is there any such relation? What is the relation between that rate of increase and the character of the coagulated water; between it and the character of the sand; between filtering efficiency and grain size? What is the depth of the effective filtering layer, and how does it vary with conditions of temperature, coagulation, loss of head and grain size? These are some of the problems that must be solved before filter design can be rationalized. Uniformity as well as size of sand is contingent on researches in this field.

A complete solution of the comprehensive problem of designing a filter bed requires the combination and coordination of the answers to all the component questions. Until such formulation is possible designers will continue to specify filter sand much as they have done heretofore, but they should see that, as they will be the ones to benefit most, it is to their advantage to give all possible support and cooperation to those working on the basic problems of sand structure and behavior.

Gate Handling at Calderwood Dam

Two gantry cranes and improved mechanical arrangements permit one-man operation of stoney gates on 200,000-sec.-ft. spillway

By ADOLPH J. ACKERMAN
Hydraulic Designing Engineer, Aluminum Company of America, Pittsburgh

IMPROVED mechanical equipment permits the operation by one man of the entire flood-gate and outlet-works installation at Calderwood Dam. This installation includes a battery of 24 stoney gates with roller trains of improved design, an automatic dogging system by which these gates may be opened to any of five different positions, two gantry cranes with special grappling hooks that automatically engage or disengage any gate at the will of the operator, and two self-slewing stiff-leg derricks, one handling freight, and the other control equipment at the intake. This entire installation is being operated by one man.

The Calderwood development consists of an arch dam, 2,500 ft. of pressure tunnel and a power house located on the other side of a mountain at a 180-deg. bend in the Little Tennessee River near Knoxville, Tenn. Previous articles on the project have appeared in *Engineering News-Record*, Oct. 24, 1929, p. 640; Dec. 19, 1929, p. 954; and Oct. 30, 1930, p. 684.

The dam is a constant-angle arch 230 ft. high above foundations and 720 ft. long, with an overflow type of crest capable of passing a maximum flood of 200,000 sec.-ft. into a cushion pool formed by a secondary gravity dam 40 ft. high. Stress conditions in the top arch ring dictated the setting of the floodgates at the downstream edge of the piers.

Design of Spillway Works

Gate Guides—The various guide members of each gate slot were all framed together with a corresponding set of guides for the adjacent gate to form a single structure and to include horizontal members for carrying the gate reactions into the body of the piers.

The resulting guide structures were sufficiently rigid to permit shop fabrication and shipping as complete units, thus assuring uniformly correct alignment. These units were later set on the crest of the dam and held to line and grade by special steel templets until concreted in place, thereby eliminating the usual grouting of guides into previously completed piers.

Flood Gates—The 25 gates are each 26 ft. long and 20 ft. high, and are built up of structural shapes consisting of I-beams, channels and plates. The end posts of each gate are extended above the water surface and are provided with holes where attachment can be made for raising and lowering. These end posts contain four guide rollers, as well as lugs which permit dogging the gate at a number of openings.

The water load on the gate is transmitted through the end members into rocker plates, which are hinged so as to permit the gate to deflect freely under load and at the same time take up the angularity between the gates and piers due to the curvature of the dam. The rocker plates bear directly against roller trains of the typical stoney type. A spare gate is included, interchangeable with all others, for repairing or painting any gate without loss of water.

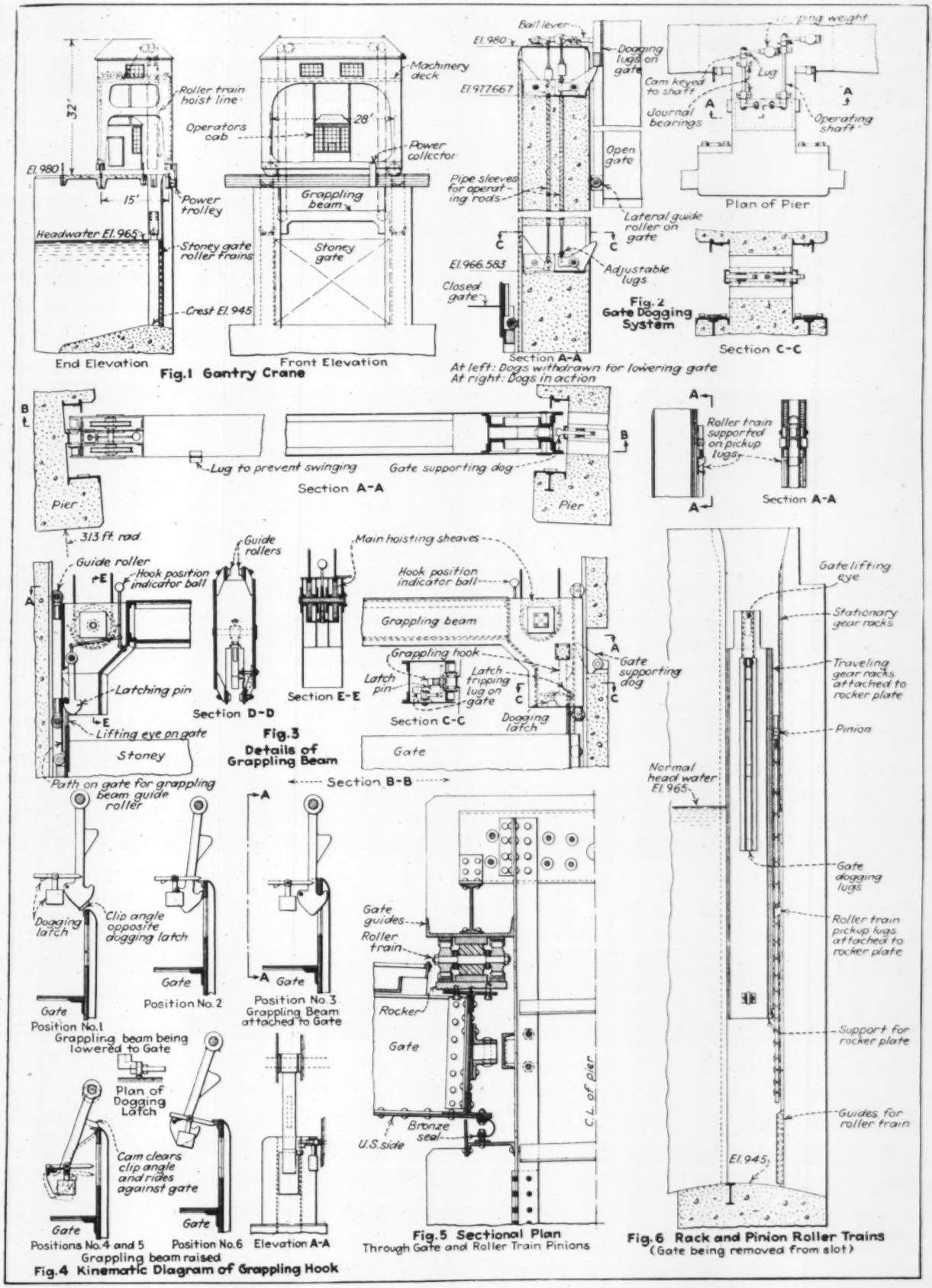
Roller Trains—In place of the usual cable supports for the roller trains a newly patented rack-and-pinion system of roller-train control has been adopted. This scheme was developed by Fred W. Ely, chief hydraulic designing engineer of Aluminum Company of America, and was originally developed for an installation of submerged gates of the stoney type. This installation operated so successfully that the general design was adapted to floodgates. The movement of the roller trains is controlled by a set of pinions that travel on stationary toothed racks mounted on the gate guides, with corresponding traveling racks located on the rocker plates of each gate. When the gate is raised beyond its normal travel for complete removal, two hooks on each rocker plate automatically engage suitable lifting lugs on the roller trains at the same instant that the pinions leave the stationary gear racks, and thereafter the trains travel at the same speed as the gates. The reverse sequence occurs when a gate is lowered into the slot. Fig. 6 clearly indicates the action.

The roller trains are built up of side members consisting of 4-in. channels and two $\frac{3}{8}$-in. plates, which straddle the bearing plate in the guides for maintaining proper alignment of the entering end of the trains. Below the water surface the side channels travel behind similar channels welded on the guide structure to prevent destructive racking of the trains by the water during spilling of water. The rollers are 6-in. cold-rolled steel and are supported on steel pins covered with sleeves of brass tubing. The pinions are steel forgings with cut teeth, bronze bushed, while the racks are of cast bronze. Tests on the bronze indicated an ultimate tensile strength of 41,000 lb. per sq.in.

Operation of Spillway

Gates—For operating the spillway, the rule was established of maintaining, for a given discharge, the thinnest practicable sheet of water by opening a larger number of gates only a fraction of their height before the magnitude of the flood required any gate to be opened to the maximum position. The gates were arranged to be dogged open at 4.7, 7, 10, 14 and 25 ft. An improved system of gate control was developed, which permits one crane operator to manipulate all the gates on the dam to and from any position of opening, without requiring him to cross the railing that is placed in front of the gate slots.

Dogging System—For the first four positions of gate opening a set of dogs is required at a level below the operating deck of the dam, as shown in Fig. 2. These lower dogs will enter supporting lugs on the sides of the gate. For the last position of 25-ft. opening, the upper set of dogs is used; these have a wider tip to prevent



Figs. 1-6—Details of stoney gate handling equipment, Calderwood Dam

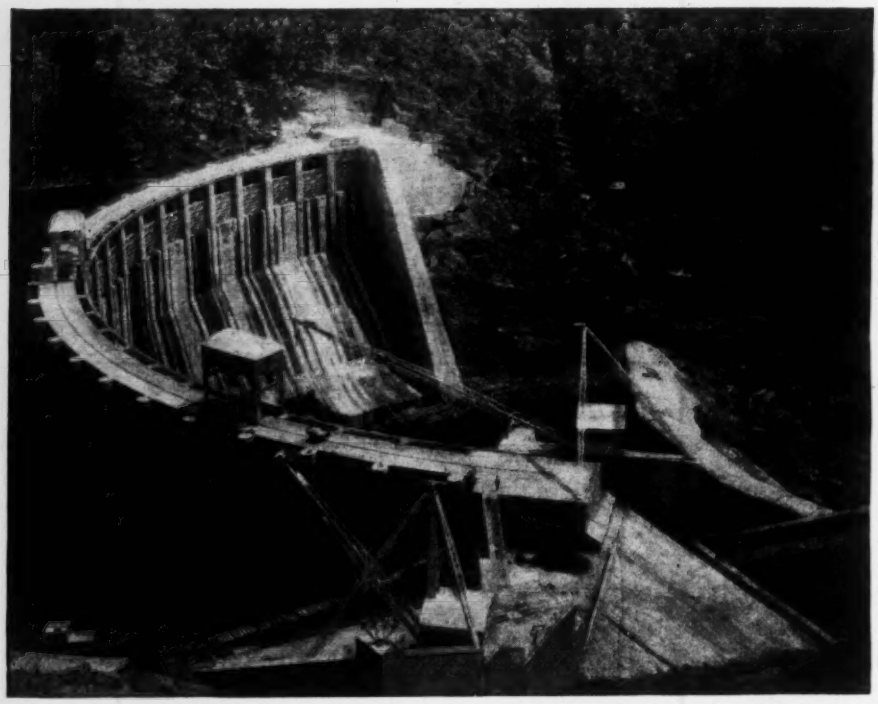


Fig. 7—General view of Calderwood Dam

Gate-handling gantries shown on top of main dam. Derrick at right is for transferring materials and supplies from railroad at foot of dam to boats on lake. Derrick in center foreground handles trash racks and gates at pressure tunnel intake. Auxiliary dam to create cushion pool to receive overflow from main dam shown at right.

their engaging any of the intermediate lugs and thus make it imperative that the gate be raised to the maximum open position.

Fig. 2 indicates the general operation of the dogging device. The normal position of the 60-lb. balls is as shown on the right-hand dog, i.e., the ball is away from the center line of the pier. In this position the dogs are free to rise as the lugs on the upward traveling gate strike them and to fall back under these lugs by which the gate is held in the desired position. After the required number of gates have thus been opened the operator is free to throw the control weights inward toward the center line of the piers, and a lug on each ball lever will engage a cam on the operating shaft, so that when a gate is subsequently raised a few inches the control weights will fall about 2 in. farther, which in turn causes the dogs to flip back into the recesses in the pier and thus permit the gate to be closed.

The tip of each dog is relatively high above its center of rotation to give a small angular travel and to prevent possible wedging during the downward travel of the gate when the gate is sliding along the tip of the upper dog. No inclosure was provided for the levers as a protection from ice and snow, since climatic conditions do not require such provisions.

Grappling Beam—The successful operation of the dogs implied an easy means of making attachment to the gate, raising and lowering it to the desired point and then releasing it. For this purpose a grappling beam (patent applied for) was developed, which consists of a steel beam with sheaves framed into it and permanently reeved to the gantry crane (Fig. 3). In the lower part of the grappling beam are two hooks, one at each end, with a special latch for each hook. The cycle of operation can be most clearly understood by referring to Fig. 4. The operation for lifting a gate merely requires that the grappling beam be lowered until the hooks drop into eyes located in the vertically extended sides of each gate. This action is indicated to the operator by the position-indicator balls located at the top of the beam (Fig. 3), and he has about 8 sec. within which he must stop the hoist in order to permit the hooks to stay in the eyes. He then reverses the hoist and raises the gate until it has passed the desired set of dogs and then lowers it onto the dogs. He further permits the grappling beam to be lowered until it rests on the gate, which causes the hooks to be latched open. The beam can now be raised, and the hooks will remain in the open position until the latches strike projecting angles on the gate, which causes the hooks to drop again into their normal postion, sufficiently above the point where it is impossible for them to fall into the lifting eyes of the gate. The hooks are now ready to take a new hold of the gate when again lowered, or to take a similar hold of another gate. Guide rollers on the beam are arranged to travel on the 7-in. channel in the pier slots and direct the beam to the gate in the correct relation to the lifting eyes. The grappling hooks are steel forgings, bronze bushed, and they, as well as the sheaves, operate on center-bored axles, pressure lubricated. Special sheave guards prevent the cables from jumping when they are slack. The dogging latch and guide rollers are mounted on roller bearings.

Gantry Cranes

The gantry cranes are principally of steel-plate construction to assure a pleasing appearance. All machinery is located on an upper deck, with ample headroom for ready inspection and maintenance (Fig. 1). A considerable saving on over-all height of the cranes was attained by setting the hoisting equipment to one side of the main-sheave supporting structure and at an elevation sufficiently below the sheaves to give the desired headroom. The machinery includes a 35-ton hoist (45-ton maximum capacity) for the main operation of raising and lowering the gates, two small 3-ton auxiliary hoists for handling the roller trains, and a traversing motor for moving the gantry. The main-hoist speed is 6.8 ft. per minute; the auxiliary hoist and traversing speeds are 50 ft. per minute. All speed-reduction gears are of the inclosed type, running in an oil bath. All three hoists have self-contained mechanical brakes, and the main hoist, in addition, has a standard solenoid brake. The wheel friction causes almost instantaneous stopping when the power is cut off; hence no special braking arrangement is required to facilitate spotting of the gantries.

The entire roof is removable for heavy servicing of the

machinery by a 50-ton self-slewing stiff-leg derrick permanently located at one end of the dam for transferring freight traffic along the river. The main wheels are of cast steel, casehardened and bronz bushed. On account of traveling on an arc of 320-ft. radius the inside wheels are smaller in diameter and the rail is set correspondingly higher in elevation, thus keeping all axles level.

A special feature is the equalizer on the main hoisting lines, which is arranged to prevent excessive loading on either hook. The coil springs on it permit a travel of 3½ in. in either direction, after which a limit switch opens the main circuit (a condition that might occur if trash from the pond should interfere with the normal action of one of the grappling hooks). Minor inequalities, such as cable stretch, etc., are equalized without permitting the grappling beam to go far from its horizontal position. Extreme upward travel of all hoists is controlled by limit

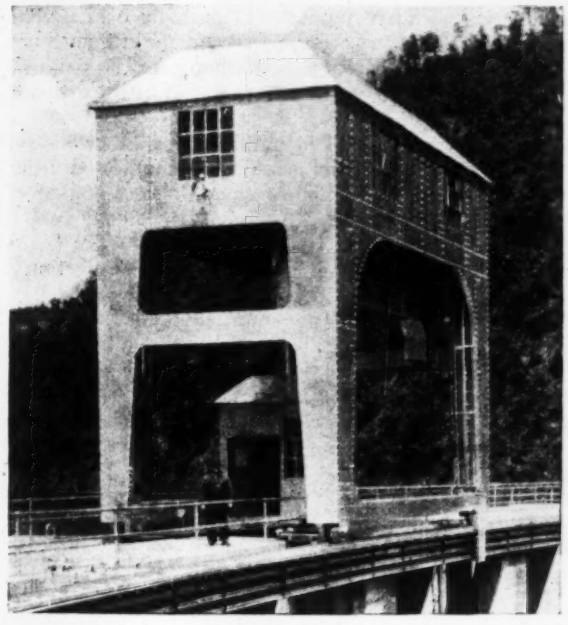


Fig. 8—One of the two gantry cranes for handling stoney gates
Note power-supply rails in foreground.

switches, while a slack-cable limit switch prevents the main-hoist drum from feeding cable when entirely unloaded, which occurs whenever the grappling beam comes to rest on the gate for the purpose of locking it open. All sheaves are provided with removable guards that prevent the cable from jumping out.

From a field test each gantry crane developed the duty cycle, shown in the accompanying table, in opening a gate to its maximum position.

TIME CYCLE FOR HANDLING GATES

	Time, Min.
Crane travel from gate to gate and spotting	1
Lowering beam to gate from its high position	4.2
Raising gate to full open	4.2
Latching and releasing gate	0.5
Raising beam to clear top of gate	0.5
Total	10.4

It is of interest to contrast this rate of operation under the control of one man with some of the older developments, where three men were required for a full hour to raise or lower a single gate.

Crane Power Supply—Electric power is taken by the gantries through special arms extending over the downstream edge of the deck girder to a subway-type feeder system. The feeders consist of 30-lb. rails, copper faced and cut to the same length as the girders and jointed with expanding type connections.

All equipment and appurtenances on the dam were painted with two coats of aluminum paint.

Personnel—The Calderwood development was built by the Knoxville Power Co., a subsidiary of the Aluminum Company of America, under the direction of James W. Rickey, chief hydraulic engineer. James P. Growdon, assistant chief hydraulic engineer, had direct supervision of all design and construction. The mechanical handling system on the gates, as well as the design of the gantry cranes, was developed by the writer. The erection of this equipment was carried out under I. G. Calderwood, general superintendent, and J. B. Hays, resident engineer. The gates, guide structures and all appurtenant mechanical equipment were fabricated by the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The gantries were built by the Whiting Corp., Harvey, Ill.

Good and Bad Concrete

CAREFUL OBSERVATION of a large number of concrete structures, old and new, in mild and severe exposure, has led R. B. Young, testing engineer of the Hydro-Electric Power Commission of Ontario, to set definite conclusions about factors responsible for good and bad service of concrete. He listed these as follows before the American Concrete Institute:

1. Generally speaking, concrete structures are satisfactorily performing their intended functions.

2. While few concrete structures are wholly free from deterioration, the excellent condition of the greater part of even those that would be classed as examples of poor concrete and the outstanding good condition of others twenty or more years old are proof that concrete can be made durable.

3. Most cases of deterioration can be classified into a few types to which definite causes can be assigned.

4. Most of the defective concrete is due to faults of workmanship, the use of excess water and other causes that are strictly preventable with reasonable care.

5. Faulty construction joints are very prevalent and may start dangerous deterioration.

6. Unsound aggregate can cause serious disintegration, but trouble of this kind is not general and usually does not become a factor in destroying concrete unless the concrete is otherwise unsatisfactory.

7. Cement is seldom a primary cause of concrete deterioration.

8. The principal natural agents destroying concrete are frost, water and the corrosion of embedded steel.

9. Water, if allowed to penetrate concrete, may and often does totally destroy it by solvent action.

10. Fundamentally, most concrete deterioration is due to its being porous.

11. The best recipe for durable concrete is to make it so dense and impermeable that water cannot enter.

12. Harsh unworkable concretes are prone to deterioration.

13. Lean concretes, no matter how strong, are not durable.

14. Intelligent and constant supervision during construction is necessary to insure durable concrete.

Conservancy Laws Adapted to Irrigation Development

Procedure established in Ohio, Colorado and New Mexico has advantage of limiting liability of benefits

LAWS of the conservancy type, based on the noted Ohio law and permitting wider scope of improvements than laws specifically providing for irrigation or drainage, are particularly adapted to flood-control and river-improvement projects and may give greater security for district bonds, according to a paper read before the Association of Western State Engineers recently by J. L. Burkholder, chief engineer of the Middle Rio Grande Conservancy District, Albuquerque, N. M. (For a description of the district by Mr. Burkholder see *Engineering News-Record*, June 12, 1930, p. 968.) An abstract of the paper is given below. —EDITOR.

THE NEW MEXICO conservancy law is patterned after the Ohio act, under which the Miami Conservancy District carried out flood-protection works for Dayton and the Miami Valley, but it has certain changes needed to adapt it to conditions in New Mexico.

Both the Miami (Ohio) and Pueblo (Colorado) conservancy districts had flood protection as their exclusive work. But the Middle Rio Grande Conservancy District has a threefold purpose—flood protection, irrigation and drainage. It is this broadening of the conservancy act that makes the New Mexico district distinctive. The power of the conservancy court is conferred upon a single district judge, rather than a board of judges, so that he may exercise his authority in more than one judicial district. The law has stood the test of all legal attacks.

Conservancy and Irrigation District Laws—The conservancy act provides for the establishment of districts through petition of property owners to the court for any or all of the following purposes: (1) preventing floods; (2) changing, widening or deepening stream channels; (3) regulating flow of streams; (4) diverting, controlling or eliminating watercourses; (5) reclaiming draining or filling wet and overflowed lands; (6) irrigating and developing agricultural land; (7) protecting public and private property from inundation. The control of the district is placed under a board of directors the members of which are appointed by the court rather than by a political body.

Irrigation district laws provide for organizing districts for the sole purpose of irrigation. In some cases drainage and hydro-electric development may be included, but only as an incidental feature.

The true test of any law designed for the accomplishment of public improvements is whether or not it permits financing the work at reasonable interest rates Basically, this should be quite largely a question of the security within the district. If property values existing before the improvement greatly exceed the cost of the contemplated work, it is obvious that the security is ample and that any bonds issued will not be speculative, provided that the law is workable and provides clear remedies for the bondholder in case of default. However, in these times of depreciated farm values it is difficult to sell bonds which depend for security entirely upon agriculture. This condition imposes a great handicap on both irrigation and drainage districts, even where the existing security is sufficient for the reasonable protection of bonds. It operates to favor any project that can spread its cost over a wide variety of property, such as cities, towns, and public and private corporations, as well as rural holdings.

The conservancy act is essentially a benefit law, under which each separate property has a limited liability. This limit is the benefit, as confirmed by the court, resulting from the execution of the official plan. In working out this feature of the act there is created what is known as the "reservoir of benefits," which is the difference between the estimated cost and the total benefits accruing from the work outlined in the official plan. This feature is attractive for the property owners, because each may know in advance of actual construction work the full and ultimate extent of his liability. It has also the element of fairness, since the liability of each property cannot exceed the benefit. For the bondholder the reservoir of benefits provides a protection against inadequate engineering estimates and casual defaults of individual properties. It is, therefore, of advantage in financing to be able to find the benefits resulting from the execution of the official plan to be greatly in excess of the estimated cost.

Cities or towns included within conservancy districts may be subject to benefits accruing through flood protection, drainage or other improvements, the resulting tax levy against the municipality becoming an *ad valorem* tax. The same is true regarding the tax levies against counties on behalf of improvements or protection to roads or other county property, and also as to levies against the state itself for improving health and general welfare conditions. In the aggregate such *ad valorem* assessments may be a substantial part of the security behind the bond issues.

As an example of such cost distribution the Middle Rio Grande Conservancy District has a total benefit to all classes of property of $22,088,000 and a total assessment of $9,719,000. Its construction began in March, 1930, and will occupy four or five years. The cost burden is divided as follows: agricultural lands, 46.6 per cent; private property in cities and towns, 14.2; municipalities, 9.4; state and counties, 6.9; public corporations, 22.9 per cent. Of the above assessment, 16.3 per cent is an *ad valorem* tax. This is important, because bonds based on *ad valorem* taxation usually have a greater value than those based on special assessments. The irrigation district tax has the nature of a special assessment without the protection of a reservoir of benefits, and the actual and final cost of the work is the only limit of liability imposed upon the individual property.

Conclusion—While the conservancy act has met the particular needs of this New Mexico area, it is not recommended for all types of reclamation work. The strong points of the conservancy type of law may be summarized as follows: (1) It permits a wide latitude in the types of improvements to be constructed and affords the engineer an opportunity in the official plan to set forth clearly the work recommended for construction. (2) The management of the district is removed from politics. (3) Through the benefit system of cost apportionment and the reservoir of benefits it provides maximum protection for both property holder and bond buyer. (4) It provides clear remedies in case of defaults on interest or principal payments and confers on the districts powers which increase the effectiveness of the construction program. (5) It permits favorable financing of projects having existing security.

Progress on Rio Grande Conservancy Project

Day-labor construction — Power excavators working on levees and drainage ditches—Storage and diversion dams—River-control jetties

WITH 17 per cent of its four-year construction program completed in little more than six months, with progress slightly ahead of schedule, and with the cost keeping well under the estimate, the Middle Rio Grande Conservancy District has made a good start on its $10,000,000 project for flood control, drainage and irrigation on an area of 123,300 acres in the central part of New Mexico. On this project, described in *Engineering News-Record*, June 12, 1930, p. 968, an unusual feature is that the construction is being done mainly by day labor, by the district forces. Work was started in March, 1930, but did not get fully under way until July. As the district extends 150 miles along the Rio Grande, it was necessary to establish three divisions, the main office and construction headquarters being at Albuquerque, where a machine shop capable of taking care of any repair job was built, as well as a general warehouse. Division offices were established at Belén and Socorro, with warehouses and machine shops for minor repairs

The major portion of the work done in 1930 was for flood control and drainage, as this is the most important part of the program. Ninety-four miles of river levee and drainage ditch was constructed. The levee is 10 ft. high, 10 ft. wide at top and 50 ft. wide at the base. Excavation for the levee leaves an 8-ft. drainage ditch 16 ft. wide at the bottom and 40 ft. at the top (Fig. 1). The completed system will have 400 miles of levee and drainage ditch. As the valley is from 1 to 5 miles wide, about 180 miles of interior drains will be required, of which 20 miles has been constructed. No work has been done on the irrigation system, which will comprise 510 miles of main canals and laterals and will supplant the 70 primitive ditches now in use.

Excavation for the drainage and irrigation system and dams will amount to about 24,000,000 cu.yd., of which 5,000,000 cu.yd. was excavated during 1930. Since November there have been in service sixteen diesel draglines with 60-ft. booms. The December excavation record was 897,947 cu.yd., although the work was somewhat handicapped by frozen ground. The August record was 822,000 cu.yd. with twelve machines. Water flow

Fig. 1—Levee work on the Rio Grande
Borrowpit forms drainage ditch.

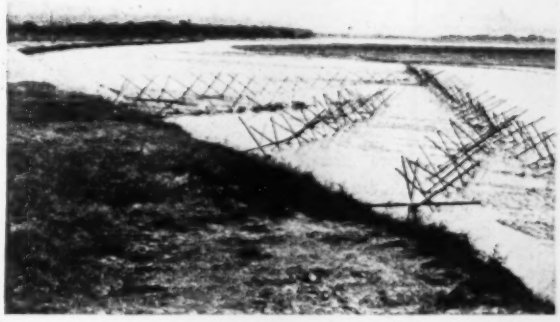


Fig. 2—Permeable jetties of steel and wire
Jetties to hold Rio Grande in permanent channel. Note that silting has begun.

Fig. 3—Trees and brush form revetment
Note steel and wire jetties beyond the felled trees.

developed by the drainage ditches has been greater than expected, and the present total of 500 sec.-ft. will increase with additional excavation. About 30 miles of permeable jetties has been placed (Fig. 2), in order to force the river to a defined channel and increase its velocity. Trees and slashings from the right-of-way, tied with wire cable, have been placed between the river bank and levee to protect more than 30 miles of levee.

All the preliminary engineering work has been completed, but there remains a vast amount of construction, location and designing. Nine engineering parties are in the field. As on most large construction jobs a great deal of the first year's work was spent in acquiring the necessary equipment, establishing division points and material yards and building the organization. During 1930 major equipment sufficient to complete the job was purchased.

Expenditures in 1930 were about $1,615,000, as follows: equipment, $500,000; labor, $500,000; right-of-way, $113,000; permanent improvements, $17,000; materials $485,000. Expenditures for 1931, while depending on the sale of additional bonds, will approximate $2,500,000. Levees, ditches and interior drains will be continued, while new work to be started will include the El Vado storage dam, diversion dams and irrigation canals. The El Vado dam, costing $1,600,000 and taking about two years to build, will be of loose gravel and rockfill, having the upstream side faced with reinforced concrete. Of the four diversion dams probably two will be completed during 1931. Each dam, costing about $125,000, will consist of a double row of sheetpiling, with rockfill between and a reinforced-concrete headgate.

It will take four years to complete the job. Joseph L. Burkholder is chief engineer of the district

Sea Wall and Groins of Steel Sheeting Stabilize Miami Beach

Steel sheetpiles provide interlocked groins and sea wall—Gunite employed for both steel and timber protection—Structure withstands hard storm

By LESLIE B. TAYLOR
Structural Engineer, Miami Beach, Fla.

IN RECENT YEARS the erosion of beach property by the ocean has become a serious problem at Miami Beach, Fla. At some locations conditions were so serious that the beach washed away and valuable buildings were threatened with undermining and ultimate collapse. Individual owners first made an effort to protect their beach and property about five years ago. There was no concerted action and the protective works were not continuous. Light sea walls, concrete bulkheads and wood groins were constructed at this time.

The groins were 100 ft. long measured from the average shore line and 100 ft. apart. They extended about 1,000 ft. along the beach. The entire groin, except hardware, was built of untreated wood. The piles were 16 ft. long and 8 ft. on centers; the sheathing was double-lapped and 4 in. thick. The wales were 6x8-in. timbers. This construction was vulnerable because the wood lacked a positive interlock, the piles and sheathing did not go deep enough, and finally the untreated wood disintegrated before the combined onslaughts of the teredo, the limnoria and wave action. These groins lasted but three years.

The September hurricane of 1926 whipped the ocean to such an extent that most of this early construction was destroyed. At that time the need for protection was forcibly brought to the attention of ocean-front lot owners and the Miami Beach city authorities by the fact that valuable land had been washed away over night, and at three places the ocean had cut a channel clear through to Indian Creek, a distance of several hundred yards.

City Plans Bulkhead and Groins

Serious efforts were made in the latter part of 1926 and early in 1927 by the city of Miami Beach to obtain an economical and effective method of beach protection. Experts were employed, plans prepared and bids taken on treated-wood groins and bulkheads, and an alternate bid was taken on a steel groin. This steel groin contemplated the use of Larsen steel sheetpiling 18 ft. long; of two 6x10-in. wales; of 25-ft. wood piles about 4 ft. apart, staggered, and of galvanized hardware. All wood was to be treated with creosote (20 lb. per cubic foot) under pressure. The tabulation of bids indicated that the steel groin was cheaper and a contract was let. The comparatively light weight of 25 lb. per square foot of wall and the greater section modulus due to increased depth plus the copper content of the steel made this pile particularly adaptable for this work.

Fig. 2—Groin with gunited holding piles

Fig. 3—Gunited piles ready for driving

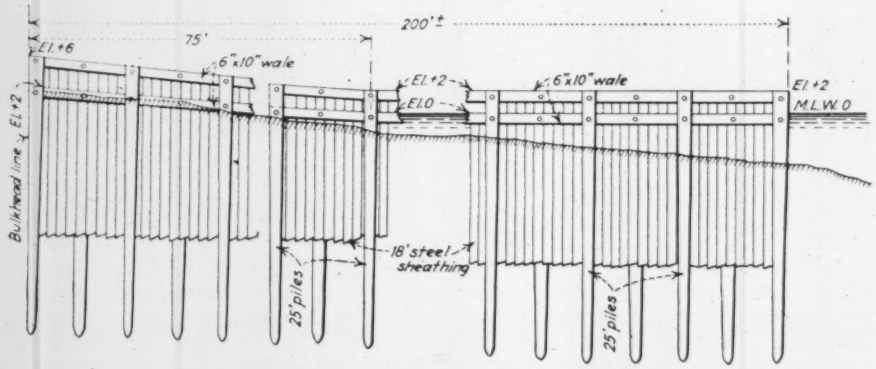


Fig. 1—Timber and steel sheetpile groin structure

The steel bulkheads as installed under the first contract in 1927 are composed of steel sheetpiles 23 ft. long. Every sixth sheetpile is a master pile 36 ft. long. The wall is backed up by channels usually of heavy 10-in. section. Tiebacks are pairs of 1-in. rods 8 ft. on centers, connected to 8 in. by

Fig. 4—Steel sheet-pile, groin capped with concrete

8 ft. treated timbers butting against an anchor log backed up by untreated 25-ft. wood piles driven to rock. The groins are connected to the bulkhead by a special T-section pile so as to make the interlocking feature continuous.

As far as possible on private construction, groins have been constructed at the property lines. They are usually two-thirds as long as the distance between center lines; that is, 100-ft. groins are located 150 ft. apart. The minimum distance apart is 100 ft., while the maximum to date is 300 ft. On all city work to date, groins have been built 300 ft. apart. These proportions have been found to give good results. In certain locations it has been estimated that as much as 2,500 cu.yd. of sand has been deposited between one pair of groins within a 24-hour period. While there is always a tendency to pile up material on the windward side and scour on the lee side, it has been noted that the ultimate result will be an almost completely reconstructed beach.

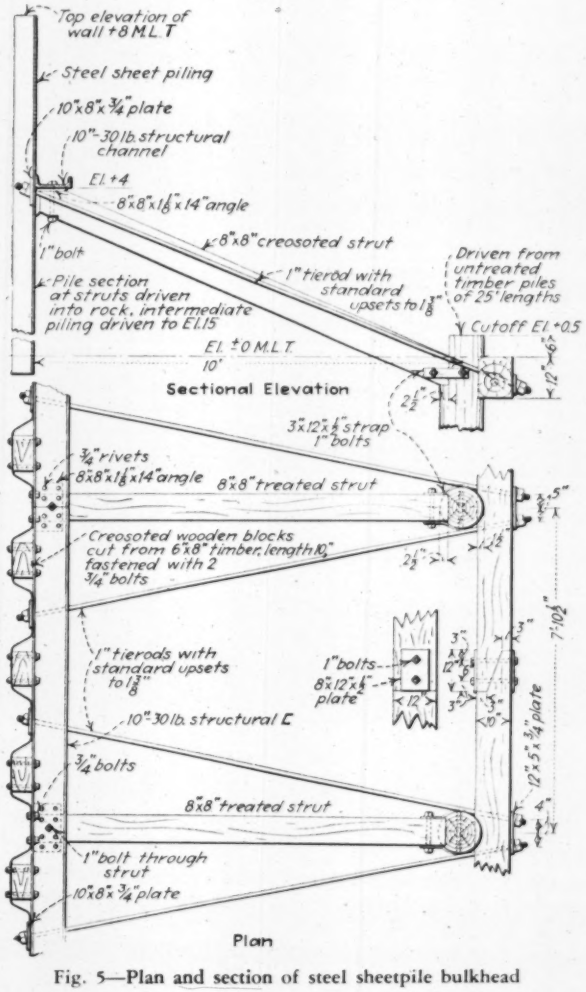


Fig. 5—Plan and section of steel sheetpile bulkhead

Certain deviations have been made from the above described Miami Beach standard by private parties. The changes have been in the interest of economy or beautification. From the economic standpoint it was found that in lieu of the expensive treated piles it was possible to build a serviceable groin by using untreated-timber piles wrapped with galvanized 3x3-in. electro-welded mesh. The pile was then gunited to a thickness of 1½ in. The proportions were one to three. Piles so protected are in excellent condition after three years' service.

Last season the city-type bulkhead and groins were installed in front of several large estates, and the bulkhead was faced with gunite and the wall capped with a

Fig. 6—Bulkhead under construction, showing bracing

Fig. 7—Concrete-capped gunited bulkhead

30-in. walk. The outer face of the wall was curved from the bottom to top of the cap. The facing was 1½ to 2½ in. of gunite reinforced by galvanized electro-weld mesh, which had previously been spot welded to the steel sheet-piling.

The mesh was kept 1 in. from the piling by means of spreaders. Prior to installing the mesh, the depressions in the sheetpile wall on the ocean side were filled with concrete, which was anchored to the piling.

Performance and Cost

On the 7½ miles of ocean beach, about 7,000 ft. of protective works has been installed to date. The longest single continuous stretch is 4,000 ft. At this time the city contemplates the installation of about 1,500 ft. of bulkhead together with the necessary groins, with no change in design. As the north end of the beach is built up with large and expensive homes, this work of beach protection will undoubtedly continue, not only for maintaining the bathing facilities but mainly to provide insurance against undermining the buildings and the destruction of valuable land. In September, 1929, Miami Beach experienced winds the velocity of which was reported to have reached 75 miles per hour. The behavior

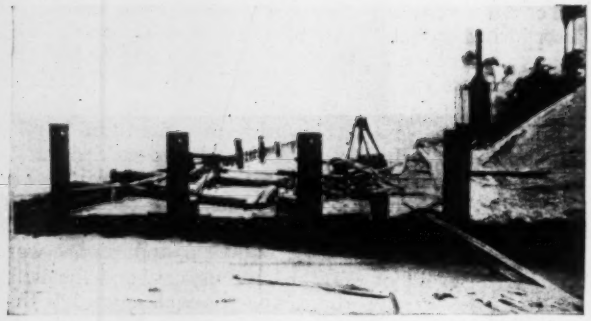


Fig. 8—Unfinished bulkhead withstood heavy storm

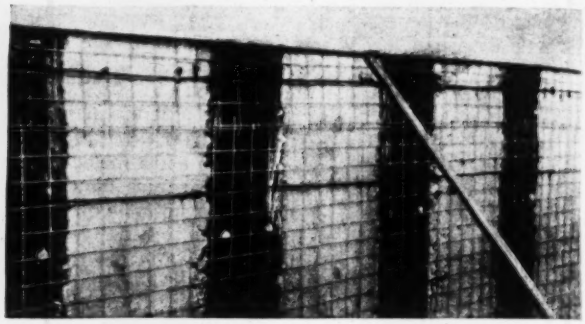


Fig. 9—Welded mesh ready for guniting

of the groins and bulkheads during this storm was entirely satisfactory. A particularly noteworthy example of the sturdiness of this construction was a 400-ft. completed section of bulkhead or wall, shown by Fig. 8. In spite of the fact that the backfill was not in place, there was no sign of damage.

The cost of the groins has average about $40 per foot, while the bulkhead has cost $50 per foot exclusive of backfill. G. O. Reed, Inc., of Miami Beach, Fla., has installed to date practically all of the beach protective works. The equipment evolved, as being particularly adapted to this class of work, consists of tugs, lighters and trucks for the transportation of material from the storage yard to the site of work. For the execution of the work the contractor has used six full-circle caterpillar cranes with unusually long booms, portable boilers, steam hammers, and four pumping units of gas and electric driven high-pressure multi-stage centrifugal pumps for jetting piles.

The city-type groin and wall was designed by the Miami Beach engineering department. Ed R. Neff, city engineer, was assited by Victor Gelineau, of New Jersey, as consultant. Contracts were let by the city commission, with Claude Renshaw as city manager.

Weather's Effect on Water Demand Discloses Sprinkling Load

Use of water during sprinkling hours shown by comparison of pumpage records for three summer days

By ARTHUR H. MILLER
Water Commissioner, Sheboygan, Wis.

STUDIES of the recorded hourly pumpage of the water-pumping station at Sheboygan, Wis., have revealed a close relationship between the hourly variation in weather conditions and the hourly demand for water, and they have enabled the engineers of the water department to determine the amount used for lawn sprinkling. Further studies have been made to determine the effect of elevated storage on the pumping requirements of the station.

Sheboygan is located on the western shore of Lake Michigan, from which it draws its water supply. The pumping equipment available at present consists of two steam-driven duplex pumps of 8- and 12-m.g.d. capacity, respectively. The water is fed to the distribution mains through two branches of 20-in. pipe leading from opposite sides of the station. There is no storage reservoir or tank, the pumps feeding directly into the mains and the pressure controlled by a governor of the pressure-regulator type. There are about 10,500 services, 55 per cent of which (including all those for commercial customers) are metered. For the city departments and all metered customers no time restriction on use of meter is imposed; but for the flat-rate customers sprinkling is allowed only from 6 to 9 a.m. and from 5 to 6 p.m.

The records, as developed by the flow-meters in the two main feeders, were studied in connection with three questions arising in the operation of the plant:

1. General characteristics of the load curve with location and extent of peaks.
2. The sprinkling load, nature and extent.
3. Storage reservoir and what it would accomplish for the system.

Weather conditions were the principal consideration in making the selection of the exact days for which the records were studied. The accompanying table shows the character of the weather on the days chosen.

	June 23	June 24	June 25	June 30	July 1
Max. temp., deg. F	85	98	83	80	83
Min. temp., deg. F	57	61	61	53	54
Average temp., deg. F	75	71	62	64	59
Precipitation	0	0.04	0	1.07	0.02
Wind	S.W.	S.E.	S	W.	S.E

It was found that the flow-meter records for three days gave ample data for a fairly conclusive study. Fig. 1 shows the pumpage as recorded by the two meters for the 24-hour period beginning 8 a.m., June 23, 1930. Figs. 2 and 3 show the records for the 24-hour period beginning at 8 a.m., June 24, and 8 a.m. July 1, respectively.

Characteristics of Load Curve—From an inspection of Figs. 1, 2 and 3 it is seen that while the curves are generally similar they differ greatly in detail. All the records show a comparatively low pumpage between the hours of 11 p.m. and 5 a.m. During this period it is often necessary to waste water back to the lake even with but one pump working, so that the minimum speed of the pump can be maintained. From 5 a.m. the load increases until 8 a.m. (morning peak). The noon-hour drop is plainly shown, followed by a gradual increase to an afternoon peak of varying magnitude. The demand falls off rather rapidly after 7 p.m.

Sprinkling Load—When the record (Fig. 1) is carefully examined in connection with the detailed variation in weather conditions on the day of June 23, some very

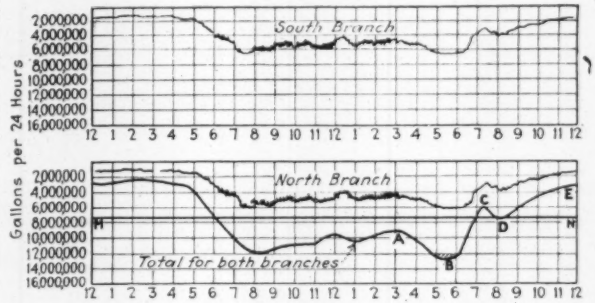


Fig. 1—Pumpage records for June 23, 1930

Threatening storm curtails demand, *B*. Lawn sprinkling ceased during light rain, *BC*. Renewed after rain stopped, *CD*. Shaded area shows storage necessary to allow operation with only 12-m.g.d. pump.

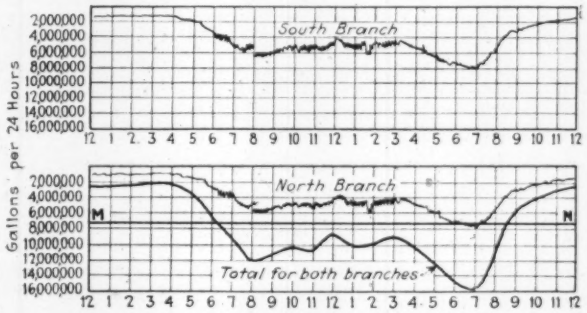


Fig. 2—Pumpage records for June 24, 1930

Clear weather all day. Load increases continuously to peak at 7 p.m.

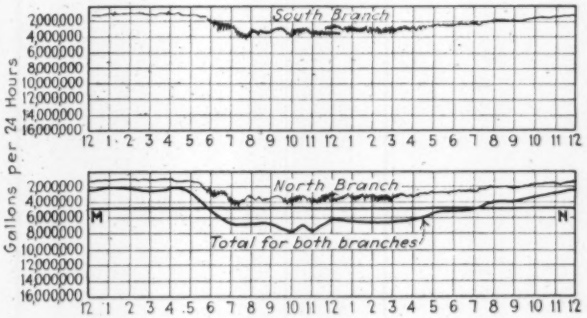


Fig. 3—Pumpage records for July 1, 1930

Weather clear. Saturation of ground, due to rain on previous day, eliminates sprinkling load.

interesting facts are developed. From 8 a.m. until 2:30 p.m., June 23, was an average clear temperate day. The thermometer at noon stood at 83 deg. with a gentle southeast wind off the lake. With a sudden change in wind direction to the southwest came an abrupt rise in temperature to 98 deg. This high temperature continued for the rest of the day. At 5 p.m. a storm appeared in the west. While the storm threatened for more than an hour, the total precipitation was only 0.04 in. What went through the mind of the water consumer is indicated with almost uncanny accuracy by the section of the curve *ABCDE*. *AB* shows the increasing demand for the normal dry hot day. The prospects of a generous rain checked this increasing demand between 5 and 6 p.m. Rain started falling shortly after 6 p.m. and *BC* shows the haste with which "Mr. Sprinkler" sought the shelter of his roof. *CD* shows that the hose was again brought into play when the amount of rain was found inadequate for a good wetting of the lawn. *DE* shows the demand falling off normally under the influence of darkness and the time limit (8 p.m.) imposed by the regulations.

Fig. 2, representing the record for June 24, goes far in support of the deductions as made for June 23. The peak rate occurred at 7 p.m., and at 16 m.g.d. shows a dangerous approach to the present capacity of the plant. The temperature on June 24 was considerably lower than on the previous day, and no rain fell at all. It is quite logical to assume, therefore, that but for the influence of the threatening storm the maximum peak on June 23 would have been at least as high as the day following.

Fig. 3, the record for July 1, a day following a very generous rain, supplies the final view in the composite picture. Since the weather conditions were similar to those of Fig. 2 (June 24), it is safe to assume that on this day little or no water was used for sprinkling purposes. Comparing rates from Figs. 2 and 3 at corresponding times, we conclude that the sprinkling demand at 8 a.m., June 24 (morning peak), is 5 m.g.d. At noon this appears to be 3.6 m.g.d., while at 7 p.m. (afternoon peak) it has gone to nearly 11 m.g.d., or approximately 75 per cent of the total load at that time.

Storage Reservoir and Its Benefits—Because of the character of the load on this plant, elevated storage naturally suggests itself as helpful. The capacity of the intake, pumps and filter plant, when finished, appears to be in proper balance and used to the safe limits at times of maximum load. Since for increased plant capacity each of the above three departments would seem to require expansion in about equal proportion, the resulting costs would be extremely large.

In all the graphs shown, areas between the curve and the upper or base line represent quantities of water in gallons. The ordinates to the horizontal line *MN* in each figure indicate the average pumping rate for the day. The area between the upper base line and the average line *MN* is a measure of the total pumpage for the period covered. From the above it follows that the area between the line *MN* and that portion of the graph below it measures the quantity of water to be stored, in order that the pumps might operate at the average rate throughout the day. Giving proper values to the areas from Figs. 1, 2 and 3, we find this quantity to be 1.6 m.g. for Fig. 1, 2 m.g. for Fig. 2, and 0.7 m.g. for Fig. 3. These are, therefore, the quantities of water required in storage on the days represented above, in order to eliminate peaks and allow the pumps to operate at a uniform rate. It is of interest to point out that the smaller of the two units (8 m.g.d.) would handle this load nicely.

The shaded peak areas, Figs. 1 and 2, measure the quantity of water required to eliminate peaks above the 12-m.g.d. rate. This quantity is found to be 27,000 gal. for Fig. 1 and 275,000 gal. for Fig. 2. It is rather surprising that such small quantities of water in elevated storage would bring the rate within the capacity of the one large unit. In this discussion regarding the effect of storage it should be kept in mind that other factors, such as location of the reservoir with respect to the main system, size of mains, etc., have vital influence. These factors were ignored in reaching the above conclusion.

Another interesting fact established by these graphs is the accuracy with which minor fluctuations in demand are recorded. The wavy character of the graphs as drawn by the recorder will be noted between the hours of 6 a.m. and 3:30 p.m. Careful study showed that this was caused by a street flusher being filled at fire hydrants. Thus, one can determine with fair accuracy the number of loads the flusher took on during the working day.

Rebuilding Railway and Highway Bridge at Attock, India

Old bridge over Indus River fitted for modern traffic by conversion of simple land spans into continuous spans and replacement of river spans by heavier trusses

By W. T. EVERALL
Bridge Engineer, North Western Railway of India

THE AUTHOR delivered a paper on this project in 1930 before the Institution of Civil Engineers in London and has prepared this illustrated abstract of his longer paper for the information of American engineers interested in similar problems. —EDITOR.

THE RECONSTRUCTION of the Indus River bridge at Attock, India, which carries the main line of the North Western Railway and the Grand Trunk Highway, was undertaken to make the bridge sufficiently strong for modern heavy rolling stock and motor vehicles. The reconstruction work involved the building of new piers, strengthening of three 257-ft. land spans by converting them into continuous trusses with a new pier constructed at the center, and the erection of two 300-ft. river spans—all without interfering with the railway or highway traffic.

The original bridge was erected in 1883 to form a link between the Punjab and the Northwest Frontier Province. As originally built, it consisted of five spans with parallel chords and double-web systems. The original trestle piers are of wrought iron. The height from low water to rail level is 139 ft.

Foundation Work—The first operation in the reconstruction plan was the building of new main piers, Nos. 1, 2, 3 and 4, around the existing trestle bents, and three intermediate piers, *A*, *B* and *C*, under the center of each of the 257-ft. spans. Work on the foundation for the river pier (No. 3) was particularly difficult because of the swift current and the rapid rises of the river. A cofferdam of two rows of steel sheetpiling driven to rock with the space between filled with concrete was used. Piers are of 1:3:6 concrete faced with blocks of 1:2½:4 concrete cast in 1-ton units.

Material for the work was delivered to the site by rail. Air-operated hoists attached to the bridge structure over the piers were employed for lifting mixed concrete and blocks. Material for the river pier was delivered over a boat bridge during the winter months and by cableway during the flood season.

Land Spans—The main trusses of the three 257-ft. land spans were strengthened by converting them to continuous spans by the addition of a central pier. By this means the chord stresses were reduced to the permissible value under the increased loading. The web system was remodeled to suit the redistribution of stress. The reactions at the supports were determined by means of calibrated hydraulic jacks, and the new central bearings were set at such an elevation that the total shear was redistributed so as to reduce to a minimum the necessary stiffening or replacement of web members toward the ends of the spans. Steel falsework was erected under the spans in order to relieve the trusses of dead-load deflection and live-load stress in the bays where the strengthening was carried out.

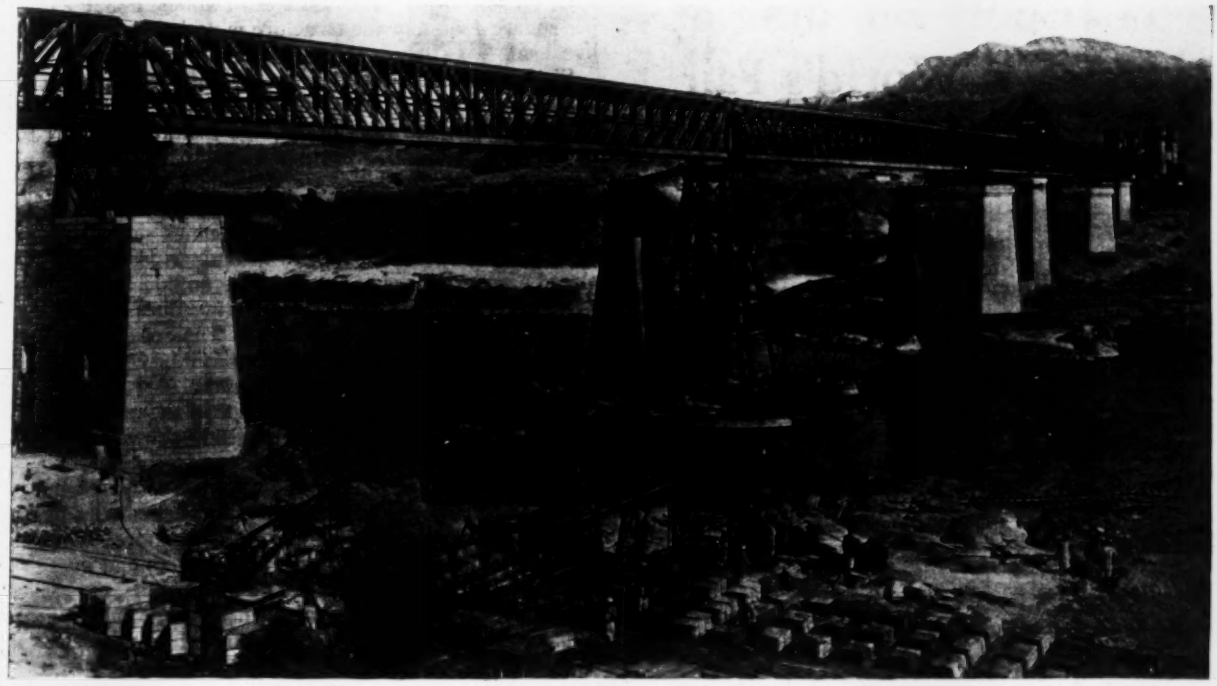
River Spans—The two new 304-ft. river spans were erected by cantilevering from the piers. The anchor arms for the shore ends of these river spans were provided by the existing land spans, while the halves of the river spans adjacent to the center pier, No. 3, were erected so that each half balanced the other so far as possible.

The new trusses were spaced at 28-ft. centers and were erected outside the old ones, which were 18-ft. centers. The new panel lengths were so arranged as to enable the new top floorbeams to be threaded in between the old work. In this way the new trusses were completely erected before the existing spans were interfered with. To provide for the difference in centers of trusses of the new and existing spans, temporary steelwork in the form of ties was provided between the top chords over piers 2 and 4 for taking the tension component of the cantilevers built out from these piers. The compression component was taken by struts attached to the lowest point of the framed structures under the anchor span. These struts passed through openings in piers 2 and 4.

For the erection work at the center pier, No. 3, the two cantilevers were tied together by means of pin-connected links at the upper chord and by inclined struts, similar to those used at piers 2 and 4, at the lowest point. Out-of-balance moment, existing when erection on one side was in advance of the other, was provided for by fixing the shoes of one of the cantilevers on pier No. 3 and by utilizing an auxiliary member known as a screw gear or adjustable strut connecting the main strut through the pier.

The cantilevers were erected so that the ends were at a higher level than required for camber, and the initial settings were such that a small gap remained at midspan when the closing bottom chord member had been placed in position. Span No. 3 was closed first. With span No. 2 and the adjoining half of span No. 3 entirely supported on roller bearings, this part of the steelwork was jacked forward toward pier No. 3 until the gap was closed. A few drift pins and bolts were inserted in the lower-chord joint, and the screw gears were operated in the struts in pier No. 3. The screw gears caused a small rotation in the plane of the trusses of all new work erected from pier No. 3, the half of span No. 3 being depressed and the half of span No. 4 being raised. Simultaneously with the operation of the screw gears, the effective length of the struts in pier No. 2 was shortened by operating mechanical jacks incorporated in these struts. When the two cantilevers of span No. 3 had been lowered sufficiently by these methods, all holes in the closing bottom chord joint were filled with drift pins and bolts.

When the closing top chord member was inserted, a small gap remained at the closing joint. The steelwork built out from pier No. 3 was then given a degree of freedom by releasing the location gears in the tunnels



Reconstructing the Indus River bridge of the North Western Railway of India

Above, the original bridge showing new pier construction, which involved incasing old wrought-iron towers with concrete and facing with precast concrete blocks. Casting plant is shown in the foreground. Masonry pier beside the structural tower in the river was built for a cutwater. Note air-operated jib cranes attached to trusses over each pier. Below, new steelwork approaching completion. Piers *A*, *B* and *C* inserted at center of existing land spans, converting them to continuous spans. New river trusses erected outside old bridge by cantilever construction.

in pier No. 3 to allow the steelwork to rotate freely in the plane of the trusses. The jacks in the struts in pier No. 2 were then released, thus causing the small gap at the center of the top chord of span No. 3 to be taken up. The closing joint was then bolted up, making span No. 3 a complete structure capable of acting as an anchor arm for the helf span of No. 4 adjacent to pier No. 3. Span No. 4 was closed in a similar manner.

Upon completion of the new main trusses the old spans were sufficiently raised by jacks operating from the new trusses to remove about one-half of their dead-load deflection. Working from the ends of the spans toward the centers, the existing rail stringers were removed and new ones were erected on the new trusses. After the railway floors had been completed the old top chords and web systems were removed. Changing the roadway floor in the plane of the lower chords followed.

The reconstruction was carried out by the bridge division of the North Western Railway in general charge of the writer, who was responsible for the scheme and its execution. H. T. Bingham was executive engineer in charge of the pier and foundation work, while the subsequent work of erecting the steel was in charge of W. E. Gelson, assistant bridge engineer under A. S. Hay, executive engineer. Rendel, Palmer & Tritton, consulting engineers, London, were responsible for the detailed design and inspection of the new 304-ft. spans and erection machinery.

Transport Building at Chicago World's Fair

Steel framing, walls and floors— Bolted connections — No windows —Interior lighting gives better effects

CONSPICUOUS for both its structural and its architectural design is the steel-frame Travel and Transport Building now under construction for the World's Fair or "Century of Progress Exhibition" to be held at Chicago in 1933. The location is on the lakefront, the site being made land formed by pumping a sand fill along the shore. This building consists of three parts: (1) a two-story rectangular portion, about 1,000x145 ft., for general exhibition purposes; (2) a rectangular annex, 100x220 ft. with three-hinged arch trusses, providing a

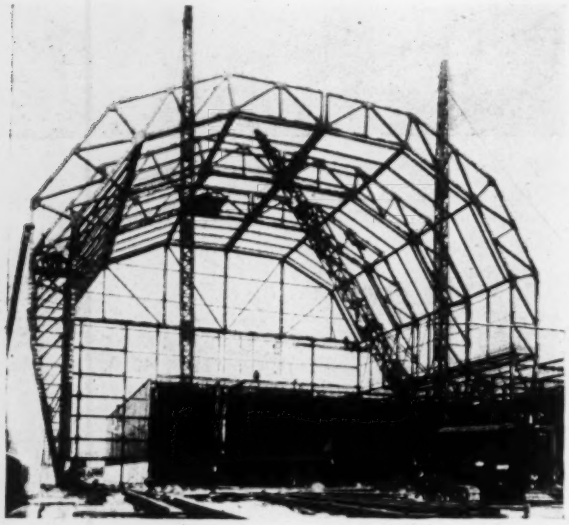


Fig. 1—Arch trusses form hall for Chicago World's Fair

clear space to house a full-size model of the section of an ocean steamer; and (3) a circular tower, 200 ft. in diameter and 125 ft. high, to house an exhibit of locomotives and having a domed roof suspended from cables attached to tall towers arranged in a circle. The three-hinged steel arch truss construction is shown in Fig. 1, while the tower and suspended dome were described in *Engineering News-Record* of Jan. 8, 1931.

Main Building—In the rectangular part of the structure, whose construction is typical of the principal exhibition buildings, the steel frame consists of standard rolled sections having bolted connections to facilitate demolition after the close of the exhibition. Its width is made up of eight 18-ft. panels. The I-beam columns, forming panels generally about 20x18 ft., are seated on concrete spread footings in the sand fill and carry transverse I-beam girders that support longitudinal truss joists. Details of this framing is given in Fig. 2, while Fig. 3 shows the typical construction. Upon this floor framing there is a deck composed of light channels of cold-rolled steel of 22 gage, all laid with legs downward. The legs of the channels are interlocked and are clipped to the floor joists. A mastic flooring will be laid on the flat deck thus formed. The dead load will be about 25 lb. per square foot, and the structure is designed for 100-lb. live load.

Similar channels rolled from 20-gage steel plate will form the inclosing walls, these channels being placed vertically with the interlocked legs inward and clipped to girts or horizontal struts about 8 ft. apart. Except for the painting of the flat exposed surface of the channels no covering will be applied to the exterior of the wall. To prevent excessive heat in the summer season an interior layer or sheathing of insulating board will be placed across the legs of the channels, so that the inclosed spaces will form a series of ventilating flues with openings to the air at top and bottom. The roof will be of similar construction to the floors but will be covered with an insulating and weatherproof material.

Entire absence of windows, except in the offices, is an unusual feature, as the result of study showed that interior electric lighting would be more economical and more advantageous. Window area may restrict exhibit space, and many of the exhibits would necessarily block the windows to some extent. Furthermore, window lighting would leave dark spots and corners and give inadequate illumination for many of the exhibits, especially on cloudy days. It was decided, therefore, to adopt continual interior lighting. Ventilation will be provided by a combination of natural draft and forced draft, the latter being provided by blowers or fans. The location of the fans is along the wall at the right in Fig. 3.

Three-Hinged Arch Annex—In order to provide a large and lofty unobstructed space to accommodate the full-size section of an ocean steamer, a portion of the structure consists of a set of six three-hinged arch trusses having a span of 100 ft. between shoe pins and a height of 82 ft. from shoe pin to crown pin. To meet the re-

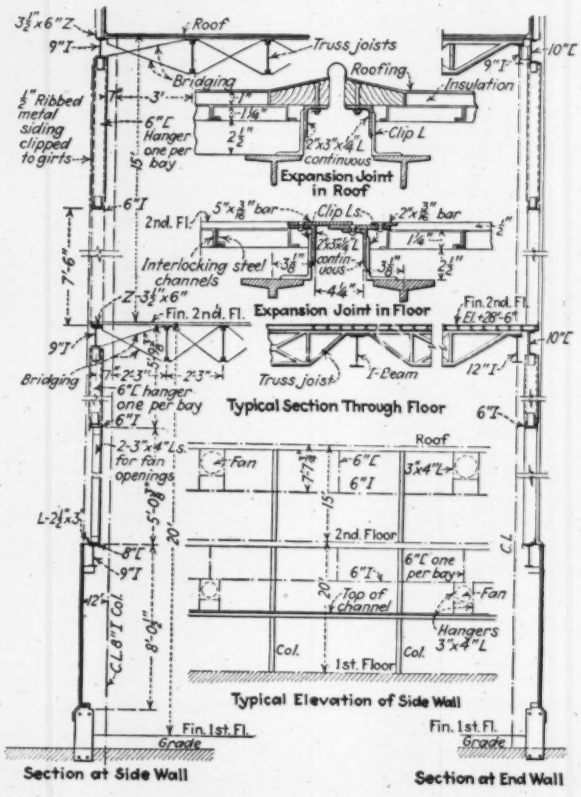


Fig. 2—Structural design of Transport Building

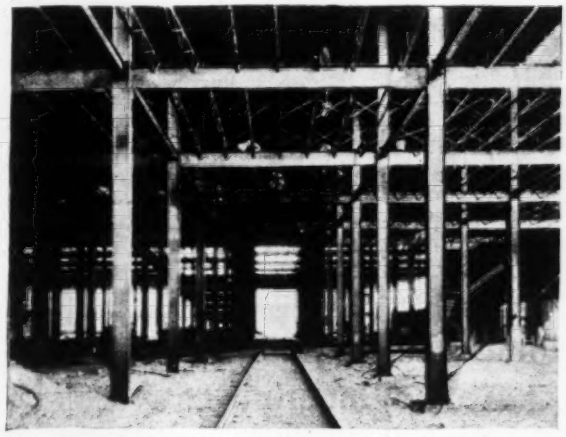


Fig. 3—Typical framing of Transport Building

quirements of the exhibit it was necessary to design the trusses with the interior face vertical for a considerable part of the height.

These trusses, Figs. 1 and 4, are about 31 ft. apart, connected by I-beams and diagonal bracing on the inner chord. The roof framing consists of I-beam rafters and purlins, carrying the same type of roofing as that on the main building, already described. However, the roof framing is carried by the bottom chords, so that the trusses extend above the roof and form exterior ribs, which are incased and weatherproofed. The crown joint has a 2-in. pin and the shoes have 3-in. pins, all protected by pipe sleeves. The tierods connecting the shoes have loop ends fitted over these sleeves. The end 31-ft. bays are closed by rigid frames which carry the girts and framing for the wall sheathing. Attached to these end frames are horizontal trusses that take the wind stresses on the end walls.

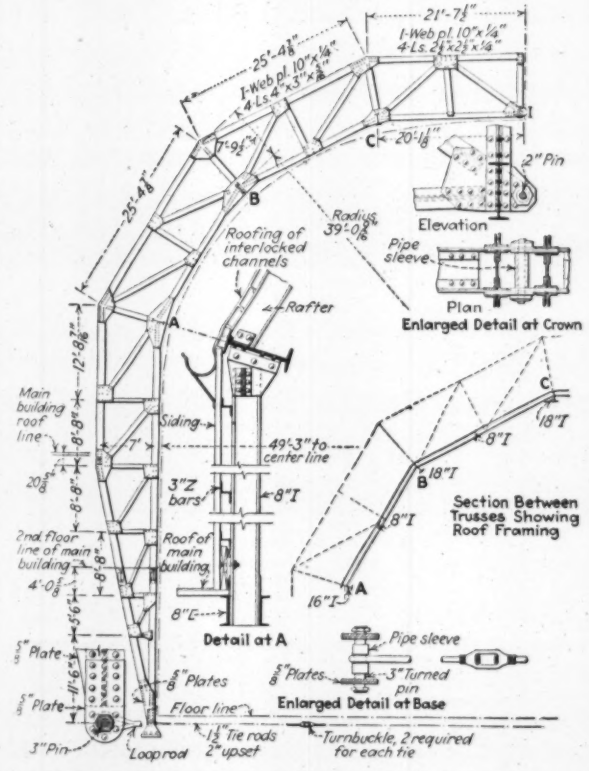


Fig. 4—Arch truss of building to house an ocean liner

Designers—All the main buildings for the exhibition are designed under the direction of a board of architects composed of Edward H. Bennett, H. Burnham and J. A. Holabird. For the suspended dome construction, mentioned above, Leon S. Moisseiff, New York, was consulting engineer. The contractor for the Travel and Transport Building is the John Griffith & Son Co. Working drawings are prepared by the department of works of the Chicago World's Fair organization; Daniel H. Burnham is director of works; C. W. Farrier, assistant director of works; B. M. Thorud, structural engineer; L. Skidmore, chief of design; and N. A. Owings, development supervisor. Lennox R. Lohr is manager for the World's Fair organization and has F. C. Boggs as his technical assistant.

Windowless and Noiseless Factory Building

Psychological aspects of uniform interior light, washed and tempered air and reduction of noise

A WINDOWLESS FACTORY, designed with special regard to effective interior lighting, ventilation, temperature, noise reduction and other features conducive to comfort and efficiency of the workmen is now under construction at Fitchburg, Mass., for the Simonds Industries, makers of gears and tools. It is a novel development in industrial plants. The machinery layout is planned for straight-line production and a minimum of physical effort by the workmen. Experiments made in this connection are said to indicate a 30 per cent increase in working efficiency by reduction in noise, fatigue and nervous strain. Intensive operation with increased output and reduced overhead expense is made practicable at this plant, since it may be operated regularly by two shifts, the night shift having exactly the same working conditions as the day shift. This factory is a one-story structure 360x560 ft., with welded steel frame and brick exterior walls, but with no interior partitions. Not even the plant office is inclosed. By the use of trusses for the roof framing there are only 56 interior columns, thus saving floor space, since every column is considered to restrict an area within 5-ft. radius.

Lighting—Disadvantages of daylight for interior work are said to include poor distribution of light, unavoidable dark or dimly lighted spaces, the dimming of light by dirty windows or skylights and the continual variations in illumination due to changes of time, season and weather. For the interior lighting system there will be 500-watt lamps mounted about 18 ft. above the floor and fitted with diffusing shades, so as to give a uniform intensity of 20 foot-candles at the level of the working plane throughout the building. A small proportion of the light will be reflected upward upon the ceiling, thus giving a cheerful appearance and aiding the general diffusion of light. To provide against failure of the main supply of current there will be an emergency storage-battery system, which will go into service automatically. For improved visibility of the machines they will be painted orange color.

Air Conditioning—The ventilating system provides for delivering every ten minutes a volume of 500,000

cu.ft. of washed, filtered and tempered air. This will be distributed by means of ducts, and special measures will be taken to avoid drafts and air currents. A desirable moisture content will be maintained by automatic humidity control, a detail that is expected to reduce the usual trouble from colds among the workmen. In cold weather the washed air will be warmed, while in hot weather it will be cooled; the ventilating system will be under thermostatic control. Fumes, gas exhausts and excess heat will be drawn out through underground ducts.

Accoustics—Extensive study of the problem of noise reduction has been made, with a view to reducing nervous tension and distraction of the employees. For this purpose there will be special construction of walls, floor and ceiling, insulation of drop hammers and large machines, and the introduction of silencing processes. For the floor there will be wood-block paving on a concrete base, while machines that cause noise and vibration will have foundations isolated from the floor and cushioned by cork pads. For the roof there will be a deck of perforated metal covered with 1¼ in. of rock fiber in asphalt, two ½-in. layers of insulating boards laid in asphalt and a top layer of built-up waterproofing. This construction is designed not only to absorb sound but also to provide insulation against the escape of heat in winter and the admission of heat in summer.

The walls will be of sound-absorbing acustical blocks with a brick facing for architectural treatment. As these measures are expected to absorb 60 per cent of the usual factory noises, the plant office will not be separated from the body of the building by partitions. Noises caused by manufacturing processes will be reduced in different ways: (1) by masking, or allowing sounds of similar frequencies to counteract each other; (2) by tempering, or placing shields at noisy machines to intercept the sound waves; and (3) damping, or restraining the machine from giving out sound.

Color Effects—As a result of study of the psychological effect of colors, a combination of blue, green and white has been selected for the walls and ceiling. It is stated that: "The blue will reflect certain ultra-violet rays from the lamps, green is the active or energizing component, while white is for the sensation of light and cleanliness." Machines will be painted orange yellow, which will improve the visibility of machine parts and aid in preventing accidents to operators.

This factory building was designed and built by the Austin Company, Cleveland, Ohio.

New Windowless Building for Paper Manufacture

Advantages of lighting, temperature and humidity control of the new windowless-type construction have been recognized by the Blandin Paper Co., Grand Rapids, Minn., and it now has under construction a building of this type to house a new 156-in. newsprint machine. Construction is well under way, and the building is expected to be in service by the beginning of summer. Equipment layout, building and power-plant design were carried out by the engineering department of the paper company, but the building is being constructed by the Jacobsen Engineering Co. Construction costs on buildings of this kind are believed to be slightly lower, and in the cold district in which the plant is located it is expected that heating costs will be somewhat less than with the usual type of building. The building's basic advantage, however, relates to the manufacturing process, in which temperature and humidity control are extremely important. Control of ventilation in the building is also expected to improve the effectiveness of the workmen. Special lighting units that do not screen out the ultra violet rays will be used. Because of the fact that 24-hour operation is required and considerable artificial lighting is necessary at all times in an ordinary mill, it is not thought that the lighting costs in this windowless building will be much more than in the usual structure with windows.

Some Recent Points Decided in Engineering Law

Reviewed by HERBERT BRAASCH
Attorney at Law, New York City

Decisions reached in cases tried in the higher federal courts and in the state supreme courts are summarized in these articles appearing from time to in *Engineering News-Record*. —EDITOR.

Highway Board Responsible for Inaccuracies of Estimates and Borings

A highway commission prepared specifications under which it let the contract for road construction in Oneida County, Wisconsin. The specifications estimated the quantities of materials to be moved as follows: 13,182 cu.yd. earth excavation; 114 cu.yd. loose rock; 57 cu.yd. solid rock; 521 cu.yd. "borrow." At another place the specifications stated: "Interpretation of Approximate Estimate—The estimated quantities of the work are the result of careful calculation, but are to be considered approximate only, and any item or all items may be increased or diminished up to 25 per cent at the option of the commission and paid for at the proposed rate."

Final estimates on completion showed 11,966 cu.yd. of earth, 945 cu.yd. loose rock, 422 cu.yd. solid rock and 2,453 cu.yd. "borrow." The contractor was credited on the basis of these final estimates at the unit rate for each as contained in his bid, but he claimed extra compensation per unit on the earth excavation item. This earth excavation was within the allowable 25 per cent variation, but the contractor contended there was an increase in labor and expense in handling it, since so much more loose and solid rock appeared than was originally estimated; that earth to be excavated is always mixed with loose and solid rock, and that the price per cubic yard of earth excavation is based upon the amount of solid rock present and the expense increases with the quantity of loose and solid rock.

The court in upholding the contractor stated that generally the contract between a municipality or state and an individual is governed by the same rules as would apply between two contracting individuals. The commission sought to secure the advantage of lower and closer offers from contractors by asking for classified bids on estimated quantities, and its specifications in effect assured the contractor that these approximate quantities had been determined, and as far as the quantities were concerned it is to be presumed the commission spoke with knowledge and authority.

The contractor was also allowed certain deductions in damages for not completing the project within the time

specified, since this part of the delay could be attributed to the extra time required because excavations were not as represented in the specifications.—*McDonald vs. State, Wisconsin.*

Advances by Owner to Builder

An owner agreed with a builder to pay a fixed amount for a completed building and to make payments in installments from time to time as work progressed, but no mention was made of the times when payment was due nor of the amount of money to be so paid. After very substantial operations the builder reached the end of his resources and asked the owner to advance the funds necessary to complete the structure or to guarantee payment to subcontractors and material men.

Upon the owner's refusal to furnish the money required the contractor brought action for breach of contract. The court decided in favor of the owner. If it is assumed that the agreement is sufficiently definite to be enforced as a contract and is interpreted as an agreement to make payments in reasonable amounts at reasonable times as work progresses (which is the most favorable position that could be given the contractor's contention), there still cannot be implied an obligation to advance money or become liable for work that is yet to be performed. If the contractor had any right, it is on the basis of work he had already completed.—*Eastman vs. Steadman, Massachusetts.*

Standard of Conduct in Emergency

Harper, a laborer, was at work in a deep trench under the direction of his foreman, Jordan. Jordan, perceiving a cave-in was about to take place, shouted "Look out!" but failed to give further indication of where the danger was. Harper ran from that part of the trench where he was safely working right into the cave-in and sustained injuries.

In defense to a negligence action Harper's employer claimed that Harper had brought the injury upon himself and asked the court to charge to that effect. The court, however, correctly charged that the conduct of Harper in an emergency must be viewed and weighed with such reasonable liberality as surrounding circumstances warrant; he ran the wrong way on hearing of the danger, but he explained that service pipes made going in the opposite direction difficult and the course he took seemed the quickest exit from danger.—*Harper vs. Murray Construction Co., North Carolina.*

Non-Compliance With Bonding Requirement of Code

The Louisiana Civil Code requires a contractor to give a bond covering labor and material, and in certain private construction it must be for the full contract price. An unpaid material man brought suit against the surety. This surety claimed that the action was not properly brought, because the contractor was not made a party. On this it was held the surety was independently liable on the bond. He must seek his own relief against the contractor and cannot require the material man to do it for him.

The surety also defended that the bond was invalid because not executed according to the code requiring bond for the full contract price, whereas the one actually executed was for only a third of the required amount, but was ample as far as the material man's claim was concerned. This was held to give the material men and creditors a right to complain of the insufficiency, but certainly gave the surety no right.

The material man within a limited time could file and establish a lien on the owner's property, which he failed to do. Had he done so, the surety upon meeting the bond would be substituted to this protection, but it is now lost. The material man, however, was held justified on the contractor's default in going directly against the surety bond and ignoring other redress.—*Arcadia Lumber Co. vs. Austin, Louisiana.*

Obligations Surviving Completion and Payment

Contracts under which the C & R Construction Co. performed work for the city of Boston provided that the company would indemnify and hold the city harmless "against all claims for damage to person or property occasioned by or resulting from blasting or other methods or processes in the work of construction, whether such damage be attributable to negligence of the contractor or his employees or otherwise," and which required the company to refill the trenches dug in the streets and replace the paving and maintain it "in such a condition that traffic may be carried on over the same with safety."

At a date considerably later than the completion of the work and payment therefor a suit was brought against the city by one Roewer, who claimed he was injured in consequence of a defective condition in paving near the refill trench. The city notified the construction company of the suit and proceeded to defend it but lost to the claimant.

Being forced to pay the judgment, the city brought action to recoup from the contractor, who set up as a defense that the work was done under a contract made in 1924, that the city had made the final payment under it and that this contract stated "any balance found as provided in this article [which deals with payments] shall be deemed the final settlement under the contract." This provision, although valid, was held to be no bar to the claim of the city for damage resulting from negligence of the contractor.

The trial court held the contractor liable as a matter of law and refused to submit to the jury the question of whether the defect complained of was one that the company was bound to indemnify and resulted from methods or processes in the construction work, and it was held on appeal that this question should have been submitted to the jury.—*C & R Construction Co. vs. City of Boston, Massachusetts.*

Identity of Materials in Lien or Bond

Contracts were made between an owner and a builder for construction work upon two separate parcels of land. Louisiana required a surety bond to protect material men, this bond being the equivalent of the mechanic's and material man's lien in other states. A separate bond was given for each building operation, just as a separate lien arises for each piece of property benefited where liens exist.

Suing on such bond, the Favrot Supply Co. proved it had furnished the construction material for the two jobs but could not establish what specific material went into each. The surety defended that bond was not given for two buildings, but one bond for each building, and that its liability must be adjudicated on that basis. The court held proof of materials furnished the contractor is not sufficient to fix liability upon either building.—*Clifford F. Favrot Supply Co. vs. U. S. Fidelity & Guaranty Co., Louisiana.*

Filter Sand and Effective Size

. . . A Symposium of Authoritative Views on Needed Change in Hazen's Definition . . .

WHAT is the place of "effective size" in the selection of filter sand? The question was raised in *Engineering News-Record* of Dec. 4, 1930, in an editorial entitled "Filter Sand." Letters from many water engineers indicate that their views vary widely.

Opinions range from complete acceptance of the index as the basis of sand specifications to a conviction that a revision is absolutely necessary. The use of the effective size as a hydraulic index is explained by one writer on the ground that the smaller particles occupy the voids between the larger ones and thus exert a controlling influence on hydraulic transmission capacity. Another engineer states that the index is primarily of statistical importance and that its application to hydraulic problems was incidental in the mind of its originator. Allen Hazen's own practice in the matter under discussion, according to another, was to specify the range of sizes in the sand for a filter plant, with some limitation as to their distribution.

One of the opinions developed is that the difficulties experienced in the operation of filters have been due to shortcomings in the washing process rather than to improper sand and size. In quite a few of the letters there is expressed a tendency toward allowing sand of larger size to be used in filters and accepting higher values of uniformity coefficient. As a result of the research work now under way at Harvard, Prof. Gordon Fair has come to believe that some size index other than effective size must be developed before the hydraulic performance of the filter can be predicted.

For Slow and Rapid Filters

Malcolm Pirnie
Consulting Engineer
New York City

CONTROVERSIES that exist over filter sand are due largely to misunderstanding of the methods of analysis adopted by Mr. Hazen during the investigations at the Lawrence Experiment Station.

As pointed out in the editorial, the term "effective size" was adopted by Mr. Hazen to apply to that size of sand in millimeters below which 10 per cent of the sample was finer and above which 90 per cent of the sample was larger. The Lawrence experiments indicated that this effective size was the controlling factor in permitting flow of water through sand where sand was found and used in the natural state. This meant that the fine particles were fairly well distributed to fill the voids between larger particles and explains why the size of sand, which in volume approaches within 10 per cent of the finest sand in the mixture, was found to be the controlling factor in flow of water through the bed.

In plotting the separations of many samples of sand on double logarithmic paper the curve representing the separations was found to be practically a straight line extending below the 10 per cent separation and above the 60 per cent separation. It was therefore concluded that that size of sand in millimeters below which 60 per cent of the sample was finer, divided by the effective size, would give a figure called the "uniformity coefficient" which accurately describes the particular sand when the effective size is known.

To assure comparable results the mechanics of determining effective size and uniformity coefficient must follow exactly the methods originally used. Refinements in methods tending to more complete separation will reduce the effective size, while less thorough methods may increase it above that secured by adherence to the specified methods of separation. We have always followed, as closely as possible, the methods of separation originally specified. Accordingly, we have always had entire satisfaction in the use of sands selected for slow sand or mechanical filters under specifications for allowable limits of effective size and uniformity coefficient.

Hazen's Attitude

Paul Hansen
Pearse, Greeley & Hansen
Chicago, Ill.

MUCH of the criticism of the Hazen method results from a misunderstanding of this method. Hazen himself never proposed that effective size and uniformity coefficient should be used in specifying sand to be furnished for filter plants. On the contrary, it was his invariable practice to specify the range of sizes with some stipulation as to limitation of very fine material and very coarse material. This method is still available and still used by some engineers. Its principal difficulty is that it refers to sand grain diameters instead of sieve sizes. Hazen preferred this because he was unable to obtain sieve cloth of sufficient accuracy, and it is questionable if the standard sieve cloths made today by different manufacturers have sufficient accuracy to warrant their use for mechanical sand analyses without calibration as described by Hazen.

Hazen coined the terms "effective size" and "uniformity coefficient" to characterize filtering properties of sand as used in slow sand filtration practice. These terms made an appeal to the engineering minds of the country, and they have been used quite generally for specifying sand. The use of those terms in connection with the specification of sand for rapid sand filters is, of course, illogical and perhaps undesirable. Nevertheless they have become familiar terms and their use generally obtains a satisfactory sand, though perhaps a more satisfactory sand could be obtained by specifying the percentage of sand that should fall between designated sizes of sand grain.

Accurate Statistical Index

Abel Wolman
Chief Engineer
Maryland Health Board
Baltimore, Md.

I BELIEVE that no index of sand size can be fully interpreted for use in rapid sand or slow sand filtration without the complete sieve analysis in front of the interpretor. Our practice has always been to use both the effective size and uniformity coefficient as well as the sieve analyses themselves.

It has always appeared to me that some of the difficulties in interpretation of the Hazen results are due to the suggestions that Hazen himself made that logarithmic plottings of the findings be adopted. When this is done, the results of the sieve analyses appear on a straight line and do not show the variations at the low and high points which the original Hazen method presented and upon which, incidentally, the effective size and uniformity coefficient were predicated.

In most of the recent discussions that I have heard or read regarding the disabilities of the Hazen units, it seems to me that the following facts have been lost sight of:

(*a*) The effective size was merely an arbitrary point which was chosen at the point of flexure on a curve of sieve sizes. After reviewing hundreds of sieve analyses plotted in the fashion in which Hazen originally plotted them, I was struck by the fact that he had chosen the 10 per cent figure on a perfectly logical basis as to where the flexure in the curve of natural sands always occurred.

(*b*) From a similar review of the plottings of sieve analyses on an arithmetic base it is apparent that the uniformity coefficient, as determined by the 60 per cent

and 10 per cent values, was wisely chosen to determine the slope of the sand curve. The later suggestions that 70 per cent or 50 per cent might be better than 60 per cent have no special merit, since any one of them sufficiently far up on the sand curve would define the slope of the curve. Inasmuch, however, as the 60-10 ratio now has the strength of historical familiarity, there appears to be little reason for switching to another point on the curve which would not define the slope mathematically any more correctly.

This is particularly true if it is kept in mind that the complete sieve analysis should be reviewed in conjunction with the effective size and uniformity coefficient, in order to detect whether the particular sand sample under scrutiny deviates in any fashion from those characteristics that we might expect in a natural sand.

In much of the discussion about the shortcomings of the Hazen method I believe entire sight has been lost of the fact that the Hazen method is entirely a procedure for determining the size of sand. That part of Mr. Hazen's original contribution in 1892 that deals with the judgments as to the sizes that are best suited for filter plant operations was purely incidental to the Hazen method of determining sand size. Unfortunately, in the intervening 38 years, without careful rereading of the original contribution, the Hazen determination of sand size has been intimately bound up and confused with the applications that he suggested of his method of determining size.

The Hazen method is as excellent a statistical evaluation of sand size distributions as has so far come to light. Whether or not the effective size best suited for filtration efficiency and for conserving loss of head is 0.3 or 0.5 or 1.0 mm. has to my mind nothing whatever to do with the technique of measuring size. On the former question there is, of course, ample room for differences of opinion as well as for much future experimentation.

Usefulness Outlived

Arthur R. Holbrook
Fuller & McClintock
New York City

OUR more recent specifications on filter sand for a filter plant handling turbid water are as follows:

> Effective size not less than 0.40 mm. or more than 0.50 mm.; uniformity coefficient not more than 1.65; not more than 0.2 per cent finer than 0.20 mm.; not more than 1 per cent finer than 0.25 mm. and at least 90 per cent finer than 0.8 mm.

A very satisfactory working sand was obtained under these specifications.

The sentiment in this office is that the effective size has rather outlived its usefulness as a measure of filter sand and that it would be better to specify the amount to be passed through or retained on certain size sieves.

Causes of Difficulties

G. Gale Dixon
Deputy Chief Engr.
Mahoning Valley
Sanitary District
Youngstown, Ohio

VARIOUS commentators have called attention to the fact that the use of Hazen's "effective size" in specifying the grading of filter sand has the practical result of defining the maximum size of particle in the upper 10 per cent of the thickness of the bed after the sand has been hydraulically graded by washing; and that the efficiency of the sand bed in filtration is measured by the performance of the upper few inches of thickness.

It may be that some index of size other than Hazen's "effective size" will prove more apt for the selection of a sand for its filtration properties, but it is obvious that the widespread difficulties that have been experienced with sand beds during the past ten or fifteen years have been due to failures in the cleansing process rather than to any inherent deficiencies of the sand in regard to its function in filtration.

There is now available a fund of information regarding the washing of rapid filters that gives promise of guiding us in the avoidance of the chronic ills from which so many sand beds have been suffering. The Detroit studies, reported by Hulbert and Herring in a paper entitled "Studies on the Washing of Rapid Filters" (*Journal*, American Water Works Association, November, 1929), together with the record of corroborative operating results at Cleveland, rank easily as the most valuable contribution to the knowledge of rapid sand filters that has been made in a generation.

The conclusions drawn from the Detroit studies may be summarized as follows:

(*a*) The presence of a permanent gelatinous coating on the sand grains of a filter bed is not necessary for efficient filtration; rather, it appears to be detrimental.

(*b*) If the sand is completely cleaned at each washing, the accumulation of mud in the bed and the subsequent shrinkage and cracking of the bed will be prevented.

(*c*) The sand can be kept clean by regularly applying the upward wash at such rate as is necessary to cause an expansion of the sand bed to some 150 per cent of its volume in repose.

(*d*) The rate of application of wash water necessary to accomplish the optimum expansion of a bed of any particular sand varies in inverse function with the viscosity of the wash water and hence in direct function with its temperature.

(*e*) The size of sand grain that appears to have the most significance in correlation with the performance of a given sand under the washing condition is shown to be the size such that 30 per cent (by weight) of the grains are finer.

The conclusions regarding the operating results of the stated washing procedure appear to be definitely established for the conditions at Detroit and at Cleveland. It does not follow that at other locations, where the conditions of the raw water or of preliminary treatment are different, some other procedure might not be desirable. The principles concerning the behavior of filter sand in washing are basic, however, and appear to be thoroughly founded; and the other conclusions require disproof before they can be rejected in the study of any particular project.

The importance of the grain of 30 per cent size as an index of the performance of the sand was established at Detroit by a study of practical experimental results. In corroboration, it is interesting to recall a statement made by R. G. Tyler in his paper entitled "A Fineness Modulus for Filter Sands" (*Journal*, New England Water Works Association, p. 246, 1925) based on very different mental processes:

> If the head losses in a sand vary in some way in proportion to the surface area of the sand, as has been assumed in this discussion, one might define the mean diameter of sand grain, from this viewpoint, as such a diameter that the particles finer than this diameter have a surface area equal to that of the particles coarser than it. Such a sand grain we may term the surface median, and a determination of its value from these data indicates that it is the diameter, on an average, of that grain than which 31.1 per cent is finer.

The basic design of the filter plant now under construction for the Mahoning Valley Sanitary District, in Ohio, may be of interest as an example of one practical interpretation of the value of the results of the recent investigations.

Full facilities are being provided for washing the filters at the rate of 36 in. per minute vertical rise of wash water. A rate controller will be used, with large illuminated dial indicating the rate of flow during the washing operation. Blanked wall castings are being provided at the proper locations in the filter walls to facilitate the future installation of piping for "surface wash" of the filters if experience in operation should show the necessity for it.

The filter sand will be 21 in. deep, with specifications for sizing intended to result in an effective size of 0.40 mm., a 30 per cent size of 0.50 mm. and a uniformity coefficient of less than 1.6. A 6-in. layer of "torpedo" sand will underlie the "filter" sand, to avoid possibility of sand passing into the gravel. "Torpedo" sand is required to have an effective size of between 1.00 and 1.5 mm., with uniformity coefficient of not more than 2.00.

Little Trouble Experienced

J. P. Laboon
J. N. Chester
Engineers
Pittsburgh, Pa.

IN OUR collective experience we have had very little trouble that may be laid at the door of filter sand size, and consequently for many years we have maintained a specification based on effective size and uniformity coefficient with qualifying limits. To quote from a recent specification on "Character of Sand" and "Size and Grading of Sand":

> The sand shall be composed of hard and durable grains either sharp or rounded, substantially free from clay, loam, dust or other foreign matter and flat particles.
>
> The sand shall have an effective size of not less than 0.35 mm. or more than 0.45 mm. and a uniformity coefficient of not more than 1.65. Not more than 0.2 per cent shall be finer than 0.20 mm., not more than 1 per cent shall be finer than 0.25 mm., and at least 90 per cent shall be finer than 0.8 mm. The diameters of sand grains shall be computed as the diameters of spheres of equal volumes and all percentages shall be calculated by weight.

It has been our practice to specify a size of sand such as will produce an acceptable filter effluent with postchlorination merely as a factor of safety. Therefore the specified size of sand has been kept down but not to such a degree as would cause undue loss of head and consequently short filter runs.

Effective Size Best

Louis R. Howson
Alvord, Burdick
& Howson
Chicago, Ill.

OUR usual practice is to place an excess of sand in the beds, usually about 3 in., and by washing bring the finest of the sand particles to the surface of the bed, from which they are removed by skimming. Our specifications permit uniformity coefficients as high as 1.6. After this treatment we usually get approximately 1.3.

With respect to effective size, our office is placing greater emphasis on mixing, coagulation and settling, with the result that the water reaching the filters is better prepared, and we accordingly feel justified in using coarser sand than formerly, as

large as 0.50 to 0.55 mm. now as compared with 0.35 to 0.45 mm. a few years ago. Under difficult water conditions and where finer sand is required by state health departments, we still use as low as 0.35 mm.

Coarser Sand Now Used

N. T. Veatch, Jr.
Black & Veatch
Kansas City, Mo.

OUR practice until recently has been to specify a sand having an effective size from 0.35 to 0.47 mm. and a uniformity coefficient not to exceed 1.7. Due to our own observations and to the work done by the committee on filtering materials of the American Society of Civil Engineers we have decided on our next jobs to use a filter sand of larger size. We have in mind a sand of at least 0.55 mm. It also appears that considerable money could be saved in filter sands if what appears to be results of the committee studies are true. We are pretty well convinced that the work in the filter bed is done in at least the top 6 in. of sand, and that often local sands can be used and hydraulically graded in the bed itself.

Personally I feel that the great advance in the art of pretreatment of water being applied to the filters and the almost universal use of chlorine have made it possible to look upon the filter itself somewhat differently than we could formerly.

We believe that considerable experimentation should be done and also that considerable good would result by using a different term than effective size, according to the Hazen formula. We believe it would mean more from the standpoint of filter sand to go directly to sieve sizes, specifying a sand that will pass one sieve and be retained on another.

No Uniformity Requirements

E. Sherman Chase
Metcalf & Eddy
Boston, Mass.

UNTIL 1927 it was our custom to specify a washed sand for filter uses having an effective size of not less than 0.30 and not more than 0.40 mm. and a uniformity coefficient of not more than 1.6. The stringency of these requirements limited the sources from which such sand might be obtained. Excessive freight rates made such sand cost $10 per yard in some places, an almost prohibitive price.

At Greenwich, Conn., in 1927 our usual specifications were used for filter sand in the 6-m.g.d. plant of the Community Water Service Co., and a New Jersey sand was obtained at considerable inconvenience and at a moderately high price. An extension of the filter wing was started before the completion of the original construction and necessitated the procuring of sand at once to fill the new boxes.

An excellent grade of concrete sand was available in Greenwich at slightly more than $1 a yard which was far less uniform than the New Jersey sand, but yet appeared to be of a quality well adapted for filtering purposes. Two of the filter boxes were filled with this concreting sand and put in service. All the filters were washed at a rate of 24 in. to 30 in. per minute vertical rise and scraped after a few weeks, thus removing about 2 in. of the finest material.

The sand so used had an effective size of 0.355 mm. and a uniformity coefficient of 4.65 when placed in the filters.

The automatic grading of the filter sands was practically complete at four months and the concreting sand, although differing markedly in physical appearance from the usual filter sand, gave a filter bed of practically the same physical characteristics. Furthermore, according to Harold C. Chandler, chemist in charge of the filter plant, the efficiency of the beds provided with the concreting sand has been as satisfactory as that of the other beds.

Based on the Greenwich experience and also upon results obtained in the actual operation of a commercial water-purification plant, we have made a modification in our specifications since 1929 that may be briefly summarized as follows:

Any sand of good quality meeting the usual specifications relative to acid-soluble matter, cleanliness and other general physical characteristics may be used for filter purposes provided its effective size lies between 0.35 and 0.45 mm. with no grains larger than those that will pass a ¼-in. screen. No limit is set for the uniformity coefficient of the sand, as reliance is placed on a 24-in. or 30-in. rate of rise during washing to grade the sand properly and prepare the bed for use.

Wider Limits Suggested

Joseph W. Ellms
Engineer Water Purification
Cleveland, Ohio

THE employment of the terms "effective size" and "uniformity coefficient" for describing filter sands has become so common that many engineers would find it difficult to evaluate sand by any other yardstick. However, this is no valid argument for the retention of these terms if better ones can be devised.

In considering the value of any sand for filtering purposes, one naturally desires to learn of what sizes the particles are and the relative proportions by weight and volume of the different sized grains. Passing a sand through properly graded sieves provides this information in a convenient form. Whether the data thus obtained, stated in terms of "fineness modulus," as suggested by Abrams, or "surface modulus" and "surface median," as proposed by Tyler, are any more descriptive or illuminating than Hazen's "effective size" and "uniformity coefficient" is probably a question that needs more study.

The general use of the high-velocity method of washing rapid sand filters, resulting from the writer's experiments at Cincinnati, produces hydraulic grading of the sand grains, so that the smallest and lightest particles are found at the surface and progressively increase in size from the top downward to the bottom of the sand layer. The effective size and the uniformity coefficient of the sand as a whole are not changed by this hydraulic grading. The relative positions of the various sized particles, however, have changed materially. Some work done by the writer (Report of the Experiments on the Purification of the Water Supply of Milwaukee, Appendix 4, p. 127) on the effective sizes and uniformity coefficients of successive layers of three different filter sands 30 in. in depth after many washings showed the upper 2 or 3 in. in each sand to have an effective size of approximately 75 per cent of the average effective size of all the sand. Intermediate layers between the top and bottom had a fairly regular increase in the effective size, as would be expected.

The writer believes that both a lower and an upper limit for the uniformity coefficient should be stated in specifications for filter sand, and is inclined to permit a higher upper limit than has been commonly used in the past. Since hydraulic grading by high-velocity washing will rearrange the particles and since the lowest layers must be of such size as to prevent them shifting through the finest gravel layers, it seems reasonable to permit greater variation in sizes, or in other words a higher uniformity coefficient. The experience at St. Louis in the formation of craters in the sand bed due to not properly grading the upper layers of fine gravel to meet the coarsest layers of sand is further evidence of the need for carefully adjusting the finer gravel layers to the hydraulically graded sand. It may be of interest to note that crater formations are quite possible if the finer gravel layers are so thin as to be displaced in washing and thereby provide no adequate support for the sand bed. There are some indications that such conditions may exist in the filter beds of one of Cleveland's plants.

In selecting sands on the basis of effective size, the writer believes that those ranging from 0.38 to 0.45 mm. will effectually filter most waters. There is, of course, a tendency to increase slightly the effective size of the sand the longer the filters are used, and, eliminating such enlargements of grains as results from incrustation, it is probably better to specify a somewhat finer sand to be used in constructing the beds than is desired eventually.

Revision Needed

Prof. Gordon M. Fair
Harvard University
Cambridge, Mass.

FOR some years the department of sanitary engineering at Harvard has studied the question of particle size of dusts and sand. A thesis on "The Hydraulics of Sand Filtration" has been under way for some time, and since the beginning of last July we have been conducting experiments on the fundamental structure of filter sands and their hydraulic properties. As we study the problems we realize that the task is far more difficult than one might assume.

At the present time we are of the opinion that we shall have to revise Hazen's parameters of sand size before we shall be able to specify materials of desired hydraulic performance. Our evidence so far obtained shows that both Hazen's "size of separation" and the so-called manufacturer's rating of sieves are not adequate measures of true particle size. We believe that the geometric mean size of particles, together with the geometric standard deviation obtained by direct measurement under the miscroscope or by microscopic projection, represents more truly both the central tendency and the dispersion of particle size, both of a sample of sand as a whole and of the component portions separated by sieving. We believe furthermore that the "mean-surface-area diameter" or the diameter of particles having average surface area may be a truer measure of hydraulic characteristics of sand than is the effective size. This seems to be particularly evident in the case of sands with a uniformity coefficient less than 2.64, at which point the effective size and the mean surface area diameter are identical. As we all know, Allen Hazen worked with uniformity coefficients less than 5 and probably nearer this value than the lower values employed in rapid sand filters. Preliminary tests seem to indicate that for sands of low uniformity coefficient the effective size is much smaller than the size that probably governs the hydraulics of the sands.

We are looking forward to a reliable determination of the laws of flow through filter sands and to a simplification of the measurement of sand sizes. Just at present our methods of analysis are quite complex, but we hope to find approximations that are capable of engineering application. We feel that we are not as yet in a position to suggest a satisfactory method for specifying filter sands.

Inland Seaport Created at Lake Charles, La.

New port developed mainly by local interests is reached by 75-mile ship channel built with government assistance

CREATION of deep-water inland ocean ports by local enterprise, with more or less assistance from the federal government, is an interesting feature of modern development in the low country along the Gulf coast. Examples of such ports, made accessible by ship channels (partly in canal and partly in the rivers) are Houston, Beaumont, Port Arthur and Corpus Christi in Texas, and Lake Charles in Louisiana. This article describes the development of the newest of these inland ports, that of the city of Lake Charles, La.; this port has been in existence barely four years. The city is about 35 miles from the Gulf in a direct line, although along its ship channel route this distance is about 75 miles. —EDITOR.

THE YOUNGEST of several new deep-water inland seaports in the low country back of the Gulf coast is that of Lake Charles, La., which was formally opened to ocean traffic in November, 1926, and has been enlarged and improved since that time. This city is on the east side of a lake which bears the same name and is the northern of a chain of five lakes extending to the Gulf of Mexico, all connected by the Calcasieu River. The largest and last of these is Lake Calcasieu, 18 miles wide. While the lakes are generally not more than 6 to 12 ft. in depth, the river has a depth of from 35 to 60 ft.

In times past, efforts were made to construct a navigable waterway to the Gulf by way of the Calcasieu River, but such a plan was not generally considered feasible for the reason that a channel excavated through these shallow lakes would fill and become obliterated. There was also difficulty of maintaining a proper depth in the pass where the river enters the Gulf, some 7 miles below Lake Calcasieu. However, the United States government constructed a barge channel through this lake and marked it with pile clusters, but this improvement is said to have been abandoned on account of maintenance of the channel being found impracticable. At the mouth of the river, known as Calcasieu Pass, the government placed two stone jetties about a mile in length, and for some years undertook to maintain a 12-ft. depth across the bar.

Deep-Water Ship Channel—An opportunity to secure a deep-water channel for the city came when the federal government decided to construct the intracoastal canal, an inland waterway from the Mississippi River to Corpus Christi, Tex. The first work on this project was on two Louisiana sections, and that section from the Calcasieu River to the Sabine River was completed in 1914 with a 6-ft. depth and a bottom width of 40 ft. To carry on a gradual improvement, a bond issue of $250,000 was voted in 1916, and Congress then appropriated $230,000 for the purpose of giving the Calcasieu-Sabine section a depth of 12 ft. and a bottom width of 90 ft. The bonds were not sold until 1923 owing to litigation to determine their validity.

In 1922 the authorities of Calcasieu Parish obtained permission from the War Department to enlarge this section of the canal to a 32-ft. depth and bottom width of 125 ft. Bonds were voted by the parish to the amount of $2,750,000 for this work. As work on the 12-ft. project had been halted by reason of war costs, so that the $230,000 appropriation had not been expended, the federal government assumed the costs for improvement to the 12x90-ft. dimensions, and the bond issue noted above was employed for the additional excavation to the present 30-ft. depth and 125-ft. width.

The Calcasieu River has a natural depth of 35 to 60 ft. and a width of 600 to 800 ft. from Lake Charles south 15 miles to the ship channel, which in turn has a depth of 32 ft. and extends westward 23½ miles to the Sabine River. This river is dredged to similar dimensions from Orange, Tex., to Sabine Lake, and another channel continues around that lake to Sabine Pass, opening into the Gulf of Mexico. Thus there is a wide channel with 32 ft. of water from the Gulf to Lake Charles, 75 miles distant (see Fig. 1). The city of Port Arthur, Tex., is on this channel, and a 21-mile branch serves Beaumont, Tex., another inland port.

Port Development—The city of Lake Charles has a population of about 15,700, with extensive rice and lumber mills as its principal industries. Three trunk-line railroads pass through it: the Kansas City Southern, the Missouri Pacific and the Southern Pacific. There is also a 13-mile line of the Brimstone Railroad & Canal Co. extending west to sulphur mines. Eight oilfields are in the neighborhood. The development of this port is notable in having been accomplished mainly without financial assistance from the federal government. However, the government's expenditure on the improvement of this section of the intracoastal canal must be taken into consideration as a part of the cost of the ship channel; the amount of the original intracoastal appropriation was $100,000, and about $600,000 was expended by the United States in developing the 12x90-ft. channel.

In 1925 the Lake Charles Harbor and Terminal District was organized, including the city of Lake Charles and some outside territory. A bond issue of $500,000 was then voted for the first wharf and terminal facilities, which were completed by November, 1926. The business

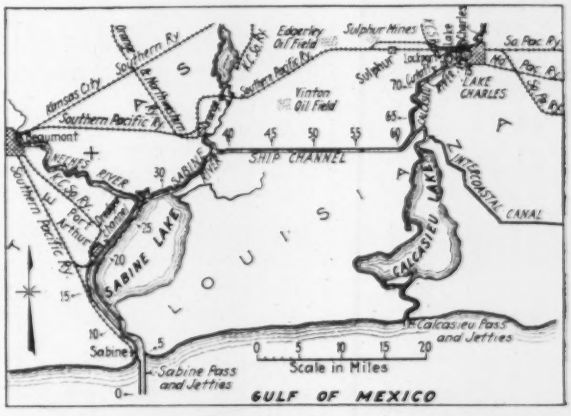


Fig. 1—Ship channel to port of Lake Charles

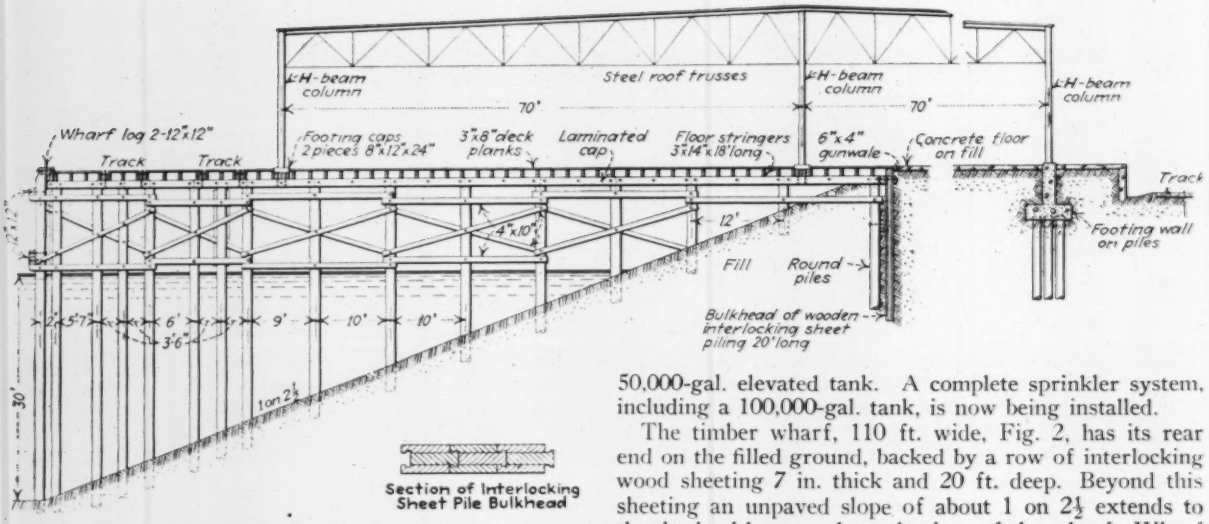


Fig. 2—Timber wharf and steel dock shed

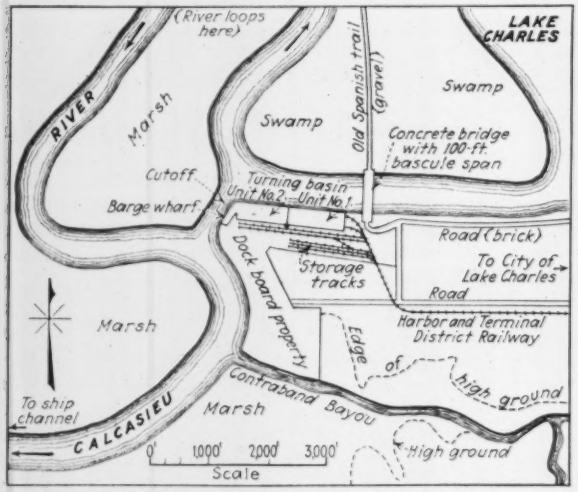


Fig. 3—Port facilities at Lake Charles

of the port developed so rapidly that in the spring of 1927 another bond issue of $500,000 was voted for a program which was completed in 1928.

The harbor site is below the bridges and on the south side of the river, which has here a width of 800 ft. and is dredged to a depth of 32 ft. to provide a turning basin for ships. The sand and mud were pumped ashore to fill about 80 acres of low ground and swamp to a height of 15 ft. above sea level.

Wharf and Freight Sheds—At present there is a timber and concrete wharf 1,600 ft. long and 180 ft. wide, with a double-track railway along the water side and other tracks on the land side. There are two one-story wharf sheds and warehouses, 140x792 ft. and 140x734 ft. These buildings provide 213,640 sq.ft. of floor area, in addition to which there is 25,000 sq.ft. of open storage space with concrete paving. For the accommodation of barge traffic there is a low-level wharf 200 ft. long and 20 ft. wide, of timber construction. Most of this barge traffic is in bringing rice from a large rice-growing territory along the river north of the city and along the intracoastal canal. Water supply for ships, boiler use and for protection is obtained from deep wells and pumped to a 50,000-gal. elevated tank. A complete sprinkler system, including a 100,000-gal. tank, is now being installed.

The timber wharf, 110 ft. wide, Fig. 2, has its rear end on the filled ground, backed by a row of interlocking wood sheeting 7 in. thick and 20 ft. deep. Beyond this sheeting an unpaved slope of about 1 on 2½ extends to the dredged bottom along the face of the wharf. Wharf construction consists of creosoted piles and timber (16-lb. treatment), with plank crossbracing above the water and longitudinal bracing in two of the deep bents. The pile bents, 8 ft. c. to c., carry laminated caps composed of four 3x12-in. planks bolted and spiked together and drift-bolted to the piles. Upon the caps are floor stringers 3x14 in., to which the single course of 5x8-in. pine deck planking is spiked. For the tracks on the wharf each rail rests on a 12x12-in. stringer having a 3x14-in. floor stringer bolted to each side; scupper holes drain the channel formed by these higher side planks. At the outer end of the deck are two curb timbers or wharf logs 12x12 in. The apron carried by the front row of piles, which is outside the caps, has two lines of 12x12-in. fenders or wales.

Typical construction of the 140-ft. wharf shed, Fig. 2, consists of steel trusses of 70-ft. span spaced 20 ft. apart and supported on three rows of steel H-beam columns 8x10 in. The columns in the outer and middle rows are seated on blocking in the wharf deck, but those of the inner row are seated on a concrete footing wall on the piles in the filled ground. A concrete floor is provided in that part of the shed on the fill. Roofing consists of felt and gravel on one shed and asbestos on the other. The sides are of corrugated iron, with doorways 20 ft. wide and 19 ft. high, spaced 40 ft. apart and fitted with sliding doors. Skylights are provided in the roofs.

A terminal railway connecting with the three trunk lines has about 5 miles of track and a yard with capacity for 100 cars. One of the trunk lines does all the switching in the terminal, under agreement with the others and with the port officials. The tracks are laid with 85-lb. rails on creosoted ties. The double-track line on the wharf front facilitates direct transfer of freight between cars and vessels and permits the shifting of cars without interfering with the transfer work. A 15-ton locomotive crane is provided for handling heavy or bulky freight, the ordinary cargo handling being done by the ships' winches and booms.

Administration—The construction of the Calcasieu Parish ship channel was administered by the police jury of the parish, the work being planned and supervised by Fred N. Shutts of the engineering firm of Frank Shutts & Sons, acting as parish engineer. A. A. Nelson is director of the port, and E. E. Shutts has been chief engineer since the district was established.

LETTERS TO THE EDITOR

Bridge Clearances Not Fixed Arbitrarily

Sir—I have noted with much interest your editorial in the April 23 number on "Light on Bridge Clearances."

The subject of bridges and their clearances has been studied with great care by the war department for many years through the various changes that have been brought about in bridge construction, the construction of ships and the varying conditions of traffic density, highway, railway and water. It seems strange to me that since you observe various clearances in existence, you draw from them the conclusion of arbitrariness in the war department. It seems to me that the existence of various clearances is proof positive that there has been no arbitrariness, but the contrary—careful consideration of each case on its merits. Nothing could be more demonstrative of arbitrariness than the insistence on fixed clearances.

There are many factors that enter into the adoption of clearances, and they are different in practically every case that comes forward for adjustment. To adopt an ironbound rule of clearances would be quite similar to saying that all streets must be of uniform width.

You mention the 57th St. bridge over the Hudson River at New York. That is an example, indeed, and is one of the most difficult ones that could be cited. The great liners that come to New York will probably land at the neighborhood of 42d-46th Sts., and the tendency will certainly be for them to go to 57th St. or above in making dock. Should the bridge be high enough to clear these liners? Should it be high enough to clear the liners of the future, and if so, how high is that? If you look at the liners that have been developed within the lives of men now living, you will see that the masts of the first one scarcely come above the main deck of those now running, and the masts of the "Oceanic," 1900, are apparently not so high as the stacks of the "Leviathan." No man can tell now what the ship of the future is going to be, even by a reference to the past. If we go by the past strictly, there will certainly be no bridge across North River where the ships must and can go. Its height would rule it out of the question. We will not go entirely by the past, but will be more liberal than that, yet not so liberal as to discard the present altogether.

We must weigh against navigation the demands of other traffic surely, and that is done. We must listen to the local authorities, and see that their laws, if not their wishes, are not violated arbitrarily. We must have some respect for the cost of things. In a great port we must remember that not all of the interest in that port resides locally, but does reside in the whole country.

The thing of bridge clearances not only is not fixed in any one locality but it is not fixed in time. We have a continuous change in all of the many conditions that affect the clearances. At one time the war and navy departments were agreed that no bridge whatever should be built between the sea and any of our first-class harbors. The reason seems obvious, since our national security may depend on our fleet getting to sea without the least delay. That policy appeared to go by the board when a permit was issued by the war department for a bridge across the Golden Gate. San Francisco is one of our most important harbors. The granting of that permit came as a shock to members of Congress who had backed that policy. But the water in the Golden Gate is deep enough to swallow the bridge in case it were dropped in time of war. The policy has not been violated at all.

No, my dear sir, you are very wrong, I assure you, in attributing arbitrariness to the war department; the facts indicate quite the contrary. It is just the fashion to say that the war department is arbitrary; and people are prone to accept such statements too readily because the war department is the war department. In time of war it is likely to be very arbitrary with those who get in the way of military operations, not otherwise.

You say that the army engineers deserve censure. That may be so. They are not infallible; they are just like other men, only they have, as a rule, less fish to fry and very much less grease in which to fry them. Your suggestion to "have recourse to a body of men informed on shipping, highway transport and the economic rights of each" is a little short of the mark, for the railways are most affected because of grade limitations. We have little trouble with highways. But if you got such a body, would you not be out of the frying pan into the fire? Maybe it would be better to have those experts tell the army engineers their views as they now do. Most any disinterested body of fairminded men can digest facts when they have them set before them. None of the juries of the land, which have to decide matters more weighty even than bridge clearances, are chosen from experts. I fear that the only solution is to "go to Congress," and tell Congress that its law that has been operating for 42 years has been very detrimental to the public interest because of the arbitrariness of the war department and the censurable conduct of the army engineers. No doubt if all the mistakes that the army engineers have made in 42 years are gathered together so that they can be seen all at once, there will be a good case against those engineers. They do make them every once in a while, no matter how hard they try to do the right thing. There may be some body of experts got together who will never make a mistake, but if so, I am inclined to believe that there will be a deal of waiting to get bridge permits, if that body has anything else to do.

You say: "Fundamentally the entire subject is one of economics with engineering considerations as a background." Unfortunately you have overlooked a matter of fundamental law. Navigation of a stream is not a matter of economics but of public right. It is a question of law, the final determination of which rests with the courts and with no one else, experts to the contrary notwithstanding.

There is one thing that shows your native kindness of heart, breaking out at last like sunshine through troublous clouds. It makes me very happy. You wish to make easier the task of the army engineer. It will be well to smooth out some of the ruggedness of his path and clear away some of the thorns. So I pray that superhuman strength will be granted to your arms.

LYTLE BROWN,
Major General,
Chief of Engineers.

Washington, D. C.,
May 2, 1931.

The Pan-American Highway

Sir—Certain organizations and newspapers in this country seem to be unduly excited by the prospects of an early Pan-American highway from New York to Panama. To those familiar with Central America, its financial affairs and its people, such a highway appears so far away on the horizon of the future that little more than faint interest can be aroused.

Before the Central American countries will be in a position to construct roads for the (apparently) sole purposes of providing outlets for American construction equipment and motor vehicles and for the travel-jaded American tourist, they must first be provided with feeders to their railroads and ports, as was so clearly stated by Fred Lavis in *Engineering News-Record*, April 16, 1930. The present low price of coffee and the prospect of such low price continuing for some time will postpone the building of the necessary development roads for many years—the luxury roads for many more. A Pan-American highway along its logical route would be a luxury highway for a great part of its length.

These countries are undeveloped and even partly unexplored—undeveloped in a sense that our nationals cannot realize. Oxcarts and horseback are still the principal modes of transportation, even in the immediate vicinity of the larger cities. Only a few of the cities of Central America have been modernized in the sense of paved streets, underground structures, etc. All the modern highways in Central America can be driven over in a single day so far as their mileage is concerned—possibly in half that time.

So much work is to be done in the modernizing of cities and the building of roads for the regions already under cultivation and settlement that no serious thought can be given to anything of an international character, except as it may fit into the system of internal roads by chance.

As an outlet for American construction equipment, tropical highway work is a disappointment. Only an inexperienced engineer invests much money in heavy equipment. The

pick, shovel and wheelbarrow operated by a 50c. to $1 per day laborer is a combination that will hold its own in competition for many years to come.

The motor-car field is equally unpromising. Given a people, probably 75 per cent of whom will not earn an average of much if any more than $100 per year, only a visionary can see any great future for a motor sales agency. As a matter of fact, most of the people who can buy cars have already done so. With the exception of Costa Rica, the wealth of Central America is very poorly distributed—probably 90 per cent in the hands of 10 per cent of the people. There is no large, prosperous middle class from which to expect large purchases of motor cars. An overwhelming majority of the inhabitants is Indian stock or mixture (Costa Rica must be excepted) accustomed to nothing, having nothing, expecting nothing and getting nothing. The poorest family in these United States would be considered wealthy in most Central American countries by the poorer classes.

As a touring prospect, it is feared that after a night or two in the hotels to be found in the smaller towns all the charm of the trip would vanish—except to the initiated.

It is probably true that eventually there will be a highway to Panama. Little by little the gaps will be filled. But development is slow, there are so many uncultivated lands near the large centers of population that there is little need for opening up new lands farther afield. The idea of an international highway is a good one, and the writer wishes it all the success there is, but let the project be taken sensibly.

R. C. HARDMAN,
Formerly Assistant Chief Engineer, Central Highway Board, Republic of Panama.

Fort Myers, Fla., April 22, 1931.

Trade Associations Not in Danger

Sir—Relative to the trade association situation: It is undoubtedly true that due to recent economic conditions there has been some loss of members among trade associations, but this is natural, I believe, in view of the general business situation. Trade associations and subscribers to newspapers and periodicals decrease the same way that a department store may lose sales or an insurance company have policies lapse during times of stress. Business concerns in casting about to save every penny possible sometimes consider memberships non-essential; even though this is an unfortunate thing for all concerned, I do not believe it should cause us to overlook the fact that this membership will be back in the fold later on.

It is likely that the tremendous increase of associations and the marked success of their efforts have led some business men to expect of them more than is reasonable or just in the way of insuring their industries against adverse general conditions or the unwise operations of individuals in the trade. I believe that the future of trade associations is more secure than ever and that the majority of business leaders will back me in my statement.

JULIUS KLEIN,
Assistant Secretary of Commerce.

Washington, D. C., May 2, 1931.

"Manufacturers Have Gone Crazy"

Sir—I have been very much interested in reading your editorial of April 9 concerning the present situation in the cement industry. You hit the nail on the head. It appears to me that cement manufacturers have gone crazy, but I presume there is nothing to do until sanity returns to the so-called "master minds."

FRANK H. SMITH,
President, Lawrence Portland Cement Co.

New York City, April 20, 1931.

Fitting Production to Consumption

Sir—The only way out of the present ruinous situation is for those in the industry to realize that, because of their selling the same identical product as their competitor, no one of us can expect or hope to get, for a long period of time, more than a fair share of the available business. Cement is just as tightly standardized as postage stamps, and no company can consistently get more for its product than another.

Therefore some equitable basis for dividing up the business must be found. This can only be done through uniform and general curtailment of production to fit the aggregate consumption. Such a plan could be easily worked out if all interested were agreeable. Of course, it might in a technical sense run foul of the Sherman anti-trust law, but I don't think the government or anyone else would cause us any trouble as long as the prices at which cement is sold are reasonable, enabling the industry to earn just a fair, decent return on its investment, and no more than that.

It is assuredly much more in line with sound public policy to protect in a decent way an investment of $750,000,000 than to let this property go to ruin, throw thousands of men out of work and be forced to reduce the wages of those remaining.

As far as I personally am concerned, I would not hesitate at all to attempt to defend such a plan before the Federal Trade Commission or the Department of Justice. It's the only remedy that will automatically and surely cure our troubles.

C. B. CONDON,
General Manager, Hawkeye Portland Cement Co.

Des Moines, Iowa, April 27, 1931.

Limited Water Supply Has Reduced Irrigated Acreage

Sir—The editorial in your last issue ("Economic Factors," April 2, p. 548), in which you attribute the cause of reduced irrigated acreage in several Western states to the elimination of lands of marginal quality occupied by marginal farmers, is applicable only in a limited way to the situation in Idaho.

Here the decrease is principally due to the elimination of lands having marginal water supplies and results from decreased stream runoff during the past decade. This decrease in runoff is well illustrated by the records on Snake River, which serves half the irrigated area of the state. During the past twelve years on this stream there have been only two years in which the runoff was above normal, while in the twelve years preceding 1919 the runoff was above normal every year except 1915. On this particular stream surplus floodwaters have been available for storage, and reservoir construction has kept pace with dwindling streamflow, so that adequate deliveries have been maintained to the farmers.

During some of the years a generation ago the natural flow alone of Snake River was adequate to irrigate fully the present acreage supplied from that stream, while in recent years it has been necessary to use upward of a million and a quarter acre-feet of stored water annually for irrigation purposes to supplement the natural flow, with an additional three-quarters of a million acre-feet used for power purposes.

On various smaller tributary streams, however, the then-existing water supply was fully developed by storage fifteen or twenty years ago, and the reduced runoff in recent years has been a more serious affair and has resulted in curtailment of irrigated acreage. There has been no appreciable reduction in irrigated acreage in this state on projects of any magnitude having adequate water supplies. On account of seepage troubles, limited areas have been forced into the production of cheaper crops, such as pasture, but they are still classified as irrigated.

The reduced precipitation and runoff in various parts of the West during the past decade have occurred over considerable areas and are underlying causes that have throttled or curtailed development in sections where soil and climatic conditions are otherwise favorable.

Whether this deficiency in precipitation is a passing phase to be soon relieved by more generous water supplies or whether it is an indication of a long-time cycle of greater aridity is a matter that only the future can disclose. The widespread character of the recent drought, however, makes this subject one of pressing concern. The residents in many sections of the country who have not heretofore seriously considered this matter are now learning what those who dwell in the arid regions have always realized—namely, that water is life and that man, after all, is but a dependent on the bounties of nature. Let the rain cease to fall and what else is there of importance?

LYNN CRANDALL,
District Engineer, U. S. Geological Survey.

Idaho Falls, Idaho, April 7, 1931.

NEWS OF THE WEEK

New York's Sixth Ave. Subway Delayed Two Years

A delay of two years in the start of construction of New York's Sixth Ave. subway has been announced by John H. Delaney, chairman of the board of transportation. Bids for the first line, between 53d and 43d Sts., were to be opened on May 19, but fear that blasting might cause a break in the water conduit which runs under the avenue and serves Brooklyn, Queens and Richmond with 200,000,000 gal. daily is felt by John J. Dietz, commissioner of water supply, gas and electricity. A break would be serious in view of the already inadequate water supply. The subway plans have therefore been laid aside until completion of the emergency water tunnel, now under construction through the Bronx, under the Harlem and East rivers, thence to Brooklyn and Queens. The contract for the tunnel calls for its completion in two years, but the contractors are ahead of schedule.

Careless Steel Erection Revealed in Wisconsin Report

Serious carelessness in the erection of structural steel work is noted in the recent quarterly report of R. McA. Keown, engineer of the industrial commission of the Wisconson state bureau of engineering. It appears that it has been necessary to issue a bulletin reminding steel fabricators and contractors of the need of maintaining good standards in fabrication and erection. Contractors on various jobs throughout the state were found to be seemingly careless in making structural steel connections. Under the provision of the building code such connections are required to be made by riveting, or by finished tight-fitting bolts in exceptional cases. But inspection of a number of jobs showed that contractors were making permanent connections with rough short-shank bolts, the full stresses between structural members being transmitted by means of the threaded portion of these bolts, which is held to constitute unsafe practice. An adaptation of the specifications recommended by the American Institute of Steel Construction is included in the Wisconsin building code.

Supreme Court Approves Limited Diversion From Delaware River by New York City

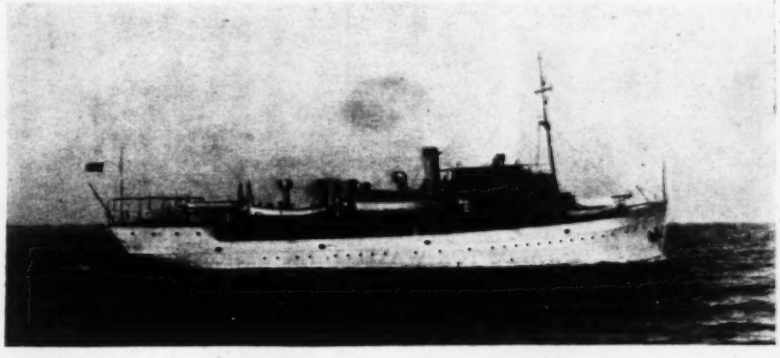
Recommendations of special master adopted—City will develop 540 m.g.d. at cost of $272,587,000

ADHERING very closely to the recommendations of Charles N. Burch, special master in the case of the State of New Jersey vs. the State and City of New York, the U. S. Supreme Court on May 5 handed down a decision permitting an average diversion of not more than 440,000,000 gal. daily (440 m.g.d.) from the watershed of the Delaware River for use by New York City for water-supply purposes. The suit was instituted May 22, 1929, by New Jersey in an effort to restrain the city from a proposed diversion of 600 m.g.d., which, it was alleged, would result in substantial injury to the state and its citizens. The Commonwealth of Pennsylvania intervened in the case to protect its own interest in the river. Full details regarding the arguments of the contending parties and the conclusions reached by the special master were given in *Engineering News-Record*, Feb. 12, 1931, p. 284.

The opinion of the court, delivered by Mr. Justice Holmes, upholds the principle of equitable apportionment of the waters of the river among the states concerned. Subject to future modification, a decree is proposed covering the following points at issue:

1. New Jersey is refused an injunction restraining New York City from diverting water from the Delaware watershed, but is granted an injunction forbidding diversion in excess of the equivalent of 440 m.g.d. But the following conditions must be satisfied: (*a*) New York City must construct sewage-works for Port Jervis, N. Y., which will effect a reduction of 85 per cent in organic impurities and 90 per cent in B. coli in all sewage discharged into the Delaware or Neversink rivers from the city. Industrial wastes must be rendered practically free from suspended matter and non-putrescent. (*b*) Whenever flow in the Delaware River shall fall below 0.50 sec.-ft. per square mile of drainage area at either Port Jervis or Trenton (equivalent to 1,535 or 3,400 sec.-ft. at these points, respectively), water shall be released from impounding reservoirs to make up the deficiency, provided that the maximum rate of release shall not exceed 30 per cent of the average annual diversion area yield, or 0.66 sec.-ft. per square mile. (*c*) Representatives of New Jersey or Pennsylvania shall have the right to inspect the dams, reservoirs and other works at any reasonable time.
2. The present diversion shall not constitute a prior appropriation.
3. The prayer of Pennsylvania for a 750-m.g.d. allocation is denied without prejudice.
4. The prayer of Pennsylvania for the appointment of a river master is denied without prejudice.
5. The decree does not affect the present jurisdiction of the war department over matters regarding navigation.
6. The court retains jurisdiction, and any party to the suit may apply to it for a modification of the decree.
7. Costs of the suit shall be allocated as follows: State of New Jersey and city of New York, 35 per cent each; State of New York and Commonwealth of Pennsylvania, 15 per cent each.

Development of the East Branch and Neversink tributaries of the Delaware River, together with Rondout Creek (located in the Hudson River water-



TO SURVEY ATLANTIC COAST LINE

The "Hydrographer," a new addition to the fleet of ships operated by the U. S. Coast and Geodetic Survey, made its official trial run April 29. It is an all-steel 750-ton vessel with a diesel-electric drive and will be used in making extensive soundings along the Atlantic coast line in the near future. Although not the largest of its ships, the "Hydrographer" was designed by the Survey especially to meet the needs of a hydrographic surveying vessel and will be equipped with the most modern apparatus obtainable. An especially large bridge is fitted with gyrorepeater peloruses and the Coast and Geodetic Survey type of electric deep-sea sounding machines.

shed) will be begun as rapidly as the necessary lands can be acquired. The work will extend over a twelve-year period at an estimated cost of $272,587,000. It will include three dams and reservoirs with connecting tunnels as well as additions to and reconstruction of parts of the present Croton system and Kensico and Hill View reservoirs. East Branch and Neversink reservoirs will be connected with the Rondout reservoir by rock tunnels 22 miles and 1 mile long, respectively. Rondout reservoir will connect with the present Croton system through a 49-mile tunnel which will cost $78,859,000, according to present estimates.

Plans for the Delaware project have already been approved by the state water power and control commission and by the city board of estimate and apportionment. Specific appropriations are yet to be made, with the exception of $50,000,000 granted April 18 for that part of the new aqueduct between Kensico and Hill View reservoirs.

Three States Act to Prevent Pollution of Waterways

At the recent sessions of the legislatures of the states of New York, New Jersey and Connecticut, resolutions were passed authorizing the appointment of a commission in each state to confer with commissions from the other states and to agree upon the terms of a treaty among the three states and the government of the United States to cover comprehensively all matters relating to the prevention and eradication of the contamination and pollution of natural waterways between the several states and of the natural waterways flowing into them. The resolutions provide that the commissioners shall report to the legislatures the terms of any treaty that may be agreed upon and shall recommend such legislation as may be necessary.

Ames Again Highway Engineer of North Carolina

Leslie R. Ames has been selected by Gov. Gardner, of North Carolina, for chief state highway engineer under a reorganization program in the state highway commission. He will succeed John D. Waldrop, who has served in that capacity for several years. Mr. Ames was chief highway engineer of North Carolina from 1919 to 1929, when he resigned to become state highway engineer of Louisiana, which position he found he could not hold because of opposing views on highway building held by himself and Gov. Long, of Louisiana.

E. B. Jeffress, of Greensboro, has been named chairman of the new highway commission. The other members are James H. Clark, N. L. Stedman, T. L. Bland, James L. McNair, Charles A. Cannon, and Will W. Neal. Mr. McNair is the only member of the old commission to be reappointed.

The legislature changed the organization plan of the commission. The old commission was organized on district lines, the state being divided into nine districts. The district organization is abolished, and the entire commission will act for the state as a whole. The new law also places all public roads of the state under the commission, doing away with county road building and maintenance.

Two Union Stations Recommended for New Orleans

Two union passenger stations, one at Claiborne Ave. and Calliope St., the other at North Claiborne Ave. and Bienville St., are recommended by the New Orleans city planning and zoning commission in its report made public last week. The commission states that its members believe a single station is the ideal plan, but opposition to such plan has led to the present recommendation.

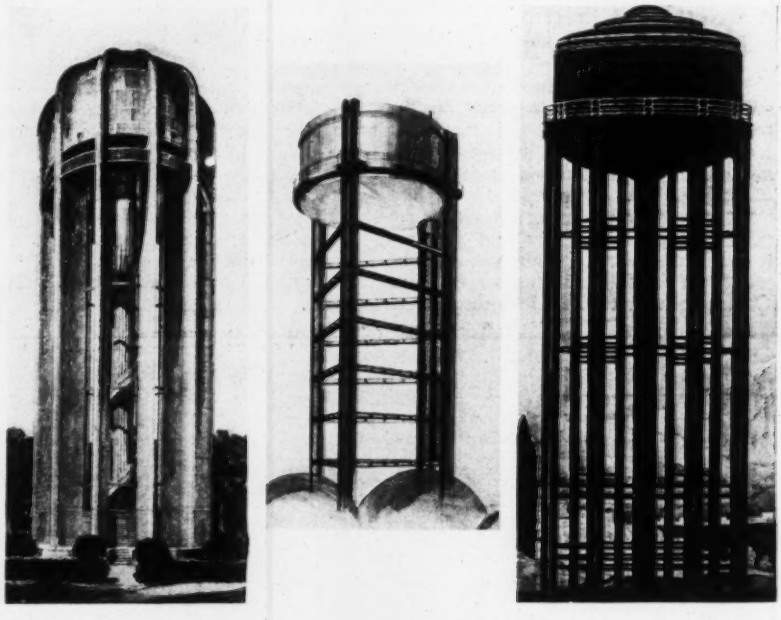
Under the commission's plans one station would be used by the Illinois Central, the Southern Pacific, the Gulf Coast Lines and the Louisiana & Arkansas, the other by the Louisville & Nashville, the Southern and the Gulf, Mobile & Northern.

New York Votes New Water Supply as Rains Increase Storage

Expenditure of $800,000 for a pumping plant to transfer water from Rondout Creek to the present Catskill supply system of New York City, has been approved by the board of estimate and apportionment. The proposed plant will make available a maximum of 200,000,000 gal. per day, which must be pumped against a head of 300 ft. This will be used merely in times of shortage, as the water is not as pure as existing supplies, particularly during the summer season, when the population of the watershed is greatly increased.

Bids which have been received for the installation of a pumping plant to transfer water from the Croton system to the Catskill aqueduct indicate that this project, estimated to cost $500,000, can be built for $335,000.

Heavy rains during the past few weeks have greatly augmented the amount of stored water in the city's reservoirs, and the danger of an immediate shortage is believed to be past. At the lowest point during the drought the city had available a stored supply for only 110 days, but the amount of water now on hand is sufficient for almost a year.

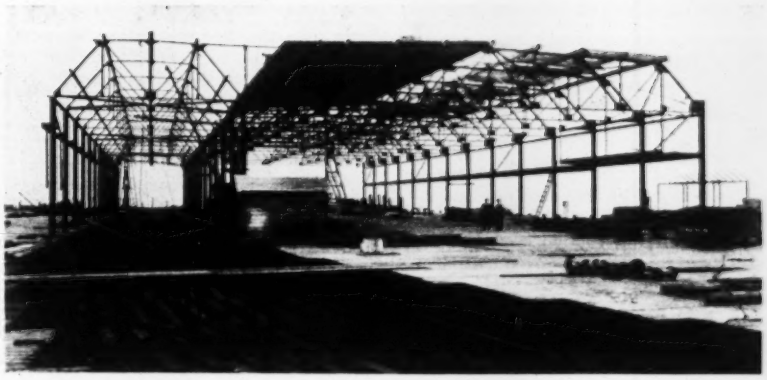


AWARDS FOR WATER-TANK DESIGNS

In the competition for attractive designs of elevated steel water tanks, sponsored by the Chicago Bridge & Iron Works, 152 designs were submitted, including several from abroad, and the awards of the jury, shown above in the illustrations, left to right, are as follows: First prize ($2,000), Eugene Voita, Chicago; second prize ($1,000), F. D. Chapman and C. M. Goldman, Evanston, Ill.; third prize ($500), Howard W. Vader, Chicago; honorable mention ($100 each), Donald A. Blake, Chicago; George A. Hossack, Chicago; Ossip Klarwein and Fritz Hoger, Hamburg, Germany; Mary Ann E. Crawford, Chicago, and Samuel E. Homsey, Cambridge, Mass. The purpose of this competition, as noted in *Engineering News-Record* of Oct. 23, 1930, p. 667, was to develop attractive architectural possibilities in the design of the typical elevated water tank and tower. Physical conditions prescribed were the use of structural steel throughout; a tank of 200,000-gal. capacity, with its top 110 ft. above the ground and bottom not less than 85 ft. above ground, and having a riser pipe at least 5 ft. in diameter. Some of the designs departed from these requirements.

Water Companies in New York Made Public Utilities

Governor Roosevelt, of New York, has signed the Thayer bill, amending the public service law in relation to the regulation and supervision of water-supply companies. By the terms of the law all water companies in the state, excepting those owned by municipalities of more than 50,000 population, are placed on the same basis as other public utilities. The Public Service Commission is given jurisdiction over issues of stock, bonds and other forms of indebtedness and over proposed mergers of such companies. Rates charged for water must be filed with the commission and any change in the rates is subject to review by the commission. Municipalities owning water-works which are exempted from the provisions of the law must file with the Public Service Commission a copy of the annual report of its department of water. The law goes into effect July 1.



NEW PIER UNDER CONSTRUCTION AT VANCOUVER

The new pier in Vancouver, B. C., being constructed by the Canadian National Steamships to replace the pier that was completely destroyed by fire last summer, will be 980 ft. from the shore line and have a total width of 216 ft. Two depressed railway tracks will be placed in the center of the dock, to facilitate handling of freight. Sheds will be built on either side of this track. A series of fire curtains reaching from the floor level and exending several feet below low tide will be a feature of the entire dock, and a special fire wall will run between the transit shed and the passenger shed. The timber has been specially treated with a fire-resisting process. Accommodation will be made for ticket offices, freight offices, general staff offices, and for customs and immigration officials.

Transportation Discussed by Chamber of Commerce

Problems involved by the increasing competition between various forms of transportation, and the problem of mass transportation in cities were subjects of round-table discussion at the nineteenth annual meeting of the U. S. Chamber of Commerce held at Atlantic City, N. J., April 28-May 1.

Wide differences of opinion were evident when railway, waterway and highway transportation men sat down on Wednesday to discuss the question, "What is fair competition in transportation?" Representatives of each group expressed their views as to means for maintaining the full vigor of their particular type of transportation, but no advance was made in determining whether any one of them now has an unfair advantage over others or in deciding as to what fields are particularly suited to each type. Thomas F. Woodlock, former interstate commerce commissioner and now assistant editor of the *Wall Street Journal*, expressed the opinion that the public is entitled to any form of transportation that is better or cheaper than existing forms, that those who use it should pay all the costs of the service, and that there is no obligation on the part of the public to subsidize any form of transportation which cannot pay its own way.

Sharp differences of opinion arose over the statement of Fitzgerald Hall, vice-president of the Nashville, Chattanooga & St. Louis R.R., that railroads are paying in taxes approximately the same proportion of gross receipts as are buses and trucks, for which they receive in return only the general privileges accorded to every taxpayer, whereas buses and trucks are furnished with a free right-of-way on which to operate a commercial business for profit. Millions of dollars are being spent every year in this country, he said, for heavier roads than are needed by 99 per cent of the vehicles in order to carry the remaining 1 per cent of heavy trucks and buses. These figures were challanged by A. J. Brosseau, president, Mack Trucks, Inc.

General principles rather than the relative merits of different types of vehicles for the transportation of passengers in cities were discussed at the conference on mass transportation. Robert I. Randolph, president of the Chicago Association of Commerce, expressed the opinion that modern city life would not be possible without such public carriers and that hence the business men of our cities should take a direct interest in the problems of these carriers in order that the service may not be impaired. Thomas Conway, Jr., president of the Cincinnati & Lake Erie R.R., expressed the opinion that the type of vehicle used was only a detail, that the problem of the city transit company was one of providing community transportation upon a sound and efficient basis.

Raising of fares is not, in itself, a solution of the problem, said T. N. McCarter, president of the Public Service Coordinated Transport. In New Jersey, he pointed out, large losses were sustained by his company through an increase in fares which although relatively small was sufficient to drive people away from its system.

Rochester, N. Y., Adopts New City Street Plan

The major street plan for Rochester, N. Y., as formulated by Harland Bartholomew, city planner, has been adopted by the city council. The plan is designed to provide for heavy traffic for many years, and includes the assignment and development of 145 miles of streets.

New Orleans Sewerage and Water Board Reorganized

Following the resignation of George G. Earl as general superintendent of the New Orleans sewerage and water board, further changes for political reasons have recently taken place. John L. Porter, who had been with the board for 31 years, has resigned as director of the water-purification stations and has accepted a position with the Shilstone Testing Laboratories. John T. Eastwood, with the board for 30 years, has resigned by request as principal assistant engineer of sewer and water. Leon Lassen, who had been connected with the board for six years, has been dismissed as assistant engineer of the water-purification stations.

Bryson Vallas, formerly city engineer, has been appointed general superintendent of the sewerage and water board, and the position of city engineer has been filled by the appointment of Pat Quinlan.

Vehicular Tunnel Is Proposed for Portland, Ore.

Another step toward construction of a vehicular tunnel under Council Crest connecting the city of Portland, Ore., with the Tualatin Valley to avoid the grade over the fringe of hills west of the city was taken when Governor Meier appointed a state tunnel commission in accordance with an act passed by the recent legislature. The act permits the sale of bonds, principal and interest of which will be payable only from earnings from the project. The new commission consists of Edward Boise and Leslie Scott, of Portland, and Otto Erickson, of Beaverton.

California University Building Collapse Still Unexplained

Investigation into the cause of the collapse of the roof of the mechanical engineering building, under construction on the University of California campus, Berkeley, Calif., has developed nothing that can be said was the cause of the accident. (*Engineering News-Record*, April 16, 1931, p. 666.) The Industrial Accident Commission has reported five possible causes of the collapse as follows:

1. The patent locking device on one or more shores may have slipped, allowing the roof to sag and start a downward movement.
2. The diagonal bracing may have been ineffective.
3. Some of the bracing may have been accidentally knocked off.
4. A possible thrust in the framework may have existed if the shoring was not plumb or if it shifted, due to the play in the hinged joint.
5. The bracing may have been insufficiently nailed.

San Francisco's New Charter Ratified by Legislature

The new charter for the city of San Francisco, which was voted by the people of San Francisco on March 26 and reported in *Engineering News-Record*, April 9, 1931, p. 623, was ratified by the state legislature and will be effective on Jan. 8, 1932. The legislature also approved the San Francisco-San Mateo counties consolidation enabling act, providing for the extension of San Francisco's municipal government to San Mateo County, if the latter county should decide to join San Francisco under a borough form of government.

Great Northern Railway to Construct New Lines

The Great Northern Railway has announced plans for the early construction of a new line 24 miles south from Bend, Ore., replacing the old Shevlin-Hixon logging railroad which has been used as part of the Bend-Klamath Falls line since 1928. The estimated cost of the new construction will be more than $1,000,000. The new line will be a part of the new California-Pacific Northwest route which will be opened in 1932 when the connection between the Great Northern at Klamath Falls and the Western Pacific at Keddie, Calif., is completed.

California Supreme Court Confirms State Toll Bridge Body

By a unanimous opinion the California Supreme Court upheld the constitutionality of the act creating the State Toll Bridge Authority. This decision is an important step in speeding action on the proposed San Francisco-Oakland bridge. The authority is the legalized agency to carry out toll-bridge construction and was created by an act of the legislature in 1929. It now has legal power to undertake plans for the structure and the issuance of $75,000,000 of revenue bonds for its construction.

The permit from the war department awaits final approval, according to reports, and no additional requirements beyond the plans as submitted are anticipated. Preliminary plans were outlined in the issue of July 31, 1930, p. 191. Further detailed studies will be begun immediately following favorable legislative action on a loan of $650,000 to be made out of state funds. This loan would be returned with 4 per cent interest out of the first sale of bonds. Intercity differences have been settled, and active prosecution of the project may be expected at once.

Fort Wayne Building Code Challenged as Arbitrary

A suit against the building code of Fort Wayne, Ind., which may result in legal precedents that will affect building codes in other cities of Indiana has been filed by Ralph Dunn, a contractor. He seeks an injunction and damages of $25,000, naming the mayor, the city, the city attorney, the building commissioner, the board of public works and others as defendants.

The complaint alleges that the building code is invalid because it is an attempt to deprive the petitioner of his property without due process of law in violation of the federal and state constitutions. It also alleges that the code gives the building commissioner arbitrary power to grant or refuse building permits upon a mere whim.

It is charged the code does not grant any appeal from the ruling of the building commissioner as to whether or not drawings, plans and specifications for buildings are in compliance with the code.

California Toll Bridges List Earnings for 1930

A net profit of $191,858, equal to 5c. per share on the 3,789,268 shares of $1 par value capital stock, was reported by the American Toll Bridge Co., San Francisco, as a result of 1930 operations. This profit, taken after deducting all charges (including income tax), corresponds to a return of 3c. per share in 1929. The company owns and operates the Carquinez and Antioch bridges at the upper end of San Francisco Bay. A pier fender for the center pier of the Carquinez Bridge, built during 1930 at a cost of $63,000, paid for out of earnings, completes major construction work on the properties.

The annual report for 1930 of the Dumbarton Bridge Co., San Francisco, showed a net profit, after making all deductions, of $4,822. The report for 1929 showed a loss of $2,402. The company owns and operates a bridge across the southern arm of San Francisco Bay.

Power and Irrigation Companies Sued in Water-Rights Case

Two power companies and seven canal and irrigation companies have been named as defendants in a suit filed in the superior court in Modesto, Calif., by 41 ranchers of western Stanislaus County, who seek $2,522,814 for alleged damages to their properties through the appropriation of water from the San Joaquin River by the companies. These companies are: Southern California Edison Co., Ltd., Miller & Lux, Inc., San Joaquin Light & Power Corporation, San Joaquin & Kings River Canal & Irrigation Co., Gravelly Ford Canal Co., Chowchilla Farms, Inc., Firebaugh Canal Co., San Luis Canal Co., and Santa Rita Irrigation Co.

The plaintiffs claim that the erection of storage dams and canals by the defendant companies has greatly reduced the streamflow, making adequate irrigation of the farm lands impossible. The complaint also sets forth that the riparian rights of the plaintiffs have been violated, and an injunction to restrain further storage of water is sought, in addition to the damages asked.

Waterway to Brownsville, Tex., Awaits Completion of Survey

Construction of the proposed waterway from the Gulf of Mexico to Brownsville, Tex., will be started following completion of the survey now under way. The ship channel will be about 4 miles long and 25 ft. deep, according to T. W. Foreman, associate engineer, U. S. Army engineers, Galveston, who is in charge of the survey. Contracts for dredging the channel and the construction of the port facilities are expected to be awarded in about six months, as soon as the survey is finished.

The federal government will spend $2,158,000 on this project, and the Brownsville Navigation District has voted $3,500,000 in bonds to finance its part of the construction work — a channel to Brownsville. The government also has appropriated $150,000 annually for maintenance.

Vancouver Authorizes Expansion of Water System

The Greater Vancouver (B. C.) water board has authorized construction of a pressure tunnel under First Narrows, gateway to Vancouver harbor, connecting city mains with reservoirs at Capilano on the north shore of Burrard Inlet. The cost is estimated as between $2,000,000 and $2,250,000, and the project, when completed, will increase delivery of water by from 25,000,000 to 30,000,000 gal. a day. It will eliminate the present system of pipes across the Narrows, which is deemed hazardous. Bids will be called immediately and completion is expected by the summer of 1933.

New Water Appropriation Code for the State of Oregon

Modeled after the federal water-power act, a new water appropriation code for the State of Oregon was enacted at the recent session of the legislature. This act creates a hydro-electric commission consisting of the state engineer and two commissioners appointed by the governor to serve without pay. The newly created commission will pass on all applications for appropriation of water from Oregon streams for power purposes. Under terms of the legislative act this body will exercise absolute jurisdiction over construction and financing cost of power projects with special authority over all power projects built by private capital. Members of the commission except the state engineer will sit only as occasion demands to pass upon power applications. C. E. Stricklin is state engineer.

Ford, Bacon & Davis Organize Subsidiary

Ford, Bacon & Davis Construction Corporation has been formed as a wholly owned subsidiary of Ford, Bacon & Davis, Inc., to handle all contract construction activities for the entire organization. The new company was organized under the laws of New York State and will have executive offices in New York City and field offices at Dallas, Tex. Officers of the company are Edgar G. Hill, president, James F. Towers and William von Phul, Jr., vice-presidents, and Henry F. Storck, secretary and treasurer. Mr. Hill and Mr. Towers are also vice-presidents and directors of the parent organization. Mr. von Phul, Jr., will manage the Dallas office.

Projects now under construction by the corporation include the last link, 155 miles long, of the 960-mile Texas Panhandle-Chicago natural gas pipe line, the East Texas-Shreveport oil pipe line for a Cities Service subsidiary, and the Western Gas Co. development.

Underground Exhibition Hall and Garage for Cleveland

The Cleveland city council has approved the issuance of bonds to cover the cost of initial work in connection with an underground chamber to provide additional space for exhibition purposes at the public auditorium and to serve as a garage for public parking when not in use for exhibitions. Entrance ramps will be provided from the street level, giving easy access to the parking areas below ground and harmonizing with the landscaped area at street level. This method has been decided as being the most feasible way of handling automobile parking in the Mall area, where all important city and county buildings are located. Construction work is scheduled to start about the first of June.

Brief News

BRAZIL'S nation-wide highway program has been postponed because of the economic situation brought about by the coffee crisis and the political unrest of 1930, according to a statement issued by the U. S. Department of Commerce.

BRICKS made from street refuse, which formerly were used in Germany mostly for pavements, have since 1928 been also used for building construction. In 1930 187 houses were constructed entirely from these bricks in the eleven German cities where this refuse is burned and the ashes pressed into bricks.

CONTRACTS have been awarded for alterations and additions to be made in San Francisco harbor involving building section 2 of the state refrigeration terminal at China Basin; construction of the shed for pier 15; and raising the grade and repaving the bulkhead wharf structures and the Embarcadero between Mission and Harrison Sts.

A SCENIC HIGHWAY that may ultimately extend for 150 miles is to be built along the summit of the Blue Ridge Mountains throughout the length of the Shenandoah National Park area in Virginia. Plans for the construction of the highway are being completed by the National Park Service, in cooperation with the U. S. Bureau of Public Roads.

CONTRACTS were let during March by 34 states for 5,642 miles of roads at a total contract price of $79,917,725, according to W. C. Markham, executive secretary of the American Association of the State Highway Officials.

MOTOR VEHICLE FATALITIES in the three-year period 1927-30 have been analyzed by the National Safety Council. The analysis shows that the number of private passenger cars involved in accident fatalities increased 37 per cent, but that the number of buses, taxicabs and trucks in such fatalities decreased 19.3 per cent.

BIDS have been called, to be opened June 17, on the construction of a $3,500,000 ammunition depot for the Navy Department at Lualaulei, T. H., and a receiving station on the West Loch. The Bureau of Yards and Docks will have general supervision over construction, which will include 131 buildings, 11½ miles of railway, 14¼ miles of road, and electric, water and plumbing systems.

AN AGREEMENT, effective May 1, which provides for continuing the present wage scale in building operations for the next three years has been entered into by the Seattle Chapter, Associated General Contractors of America, and the Seattle Construction Council, both representing the employers, and the Seattle Building Trades Council, representing all union building craftsmen.

APPLICATION has been filed with the Florida state railroad commission by the West Coast Bridge & Tunnel Co., of St. Petersburg, for a permit to construct a causeway and tunnel across Tampa Bay between Pinellas Point and Piney Point, and for a 50-year franchise to operate the causeway and tunnel on a toll basis. The application states that the war department has given its approval to the project.

PURCHASE of the wells, reservoirs, distributing system and other property of the Chapman Estate Water Co. at Pasadena, Calif., for $125,000 has been authorized by the Pasadena city board of directors, subject to approval by the California railroad commission. Since 1912, when the Pasadena municipal water department was organized, the city has acquired 21 water companies serving local consumers.

CONTRACT for the excavation and foundation for the new union inland freight terminal, to be erected on the block bounded by Eighth and Ninth Aves., West Fifteenth and West Sixteenth Sts., New York City, has been awarded by the Port of New York Authority to the Godwin Construction Co., of New York City, for $855,000. Erection of the structural steel will begin on Sept. 1 and the terminal is expected to be ready for use within a year thereafter.

BUILDING CONSTRUCTION totaling $10,000,000 is under way in Oklahoma City's business area. The construction includes one 33-story, one 32-story and one 26-story building. The Starrett Oklahoma Corp. is building the 33-story Ramsey tower office building; the Manhattan Construction Co., Tulsa, is building a 32-story bank and office structure for the First National Bank & Trust Co., and Reinhart & Donovan, Oklahoma City, have resumed construction on the 26-story $4,000,000 Oklahoma Biltmore Hotel.

The Business Outlook

The persistently static condition of business contrasts with continued declines in commodity and security markets. The decline in steel activity seems to have slackened slightly this week, but the seasonal drop from March has been a bit sharper than usual, and prices continue to weaken. Building is not holding up well, but there is still some slight encouragement in the residential field. Carloadings, especially in merchandise and miscellaneous commodities, have made a better showing this week and support other indications of slightly quickened trade activity. But there is still no sign on the horizon of any large-scale action from any source sufficiently strong to offset the certainty of a stagnant summer.

—The Business Week, May 6.

Personal Notes

WILLIAM RUTLEDGE has been appointed city engineer of Alton, Ill.

GEORGE A. RICKER, formerly Washington representative of the Portland Cement Association, has been appointed industrial consultant to the National Capital Park and Planning Commission in Washington, D. C.

WILLIAM R. ECCLES has been appointed state highway engineer of New Mexico, succeeding William C. Davidson, who had held the position since 1927. Mr. Eccles is a graduate of the University of Nebraska and was a district highway engineer in New Mexico from 1923 to 1927.

JAY DOWNER, chief engineer of the Westchester County (N. Y.) Park Commission, has been appointed county engineer, without salary, to succeed Charles MacDonald, who has resigned to enter private practice. Mr. Downer's appointment will make possible close coordination of the work of the engineering departments of the park commission and the highway department and it is possible that the next state legislature will be asked to merge the two departments.

ROBERT LACY, an engineer, and E. BROOKE LEE have been appointed members of the Maryland State Roads Commission by Gov. Ritchie, succeeding Howard Bruce and John K. Shaw, resigned. Mr. Lacy was graduated from the Massachusetts Institute of Technology and then spent about ten years in railroad construction work, later turning his attention to the contracting side of engineering.

LYMAN E. BISHOP, who for the last two years has been consulting irrigation engineer for the general cotton committee of the Soviet government, with headquarters at Tashkent, Central Asia, will return to this country on the expiration of this contract on May 29, and on Sept. 1 will resume his private practice as consulting hydraulic engineer in Denver, Colo.

A. F. ALLEN, assistant sanitarian in the division of sanitation, New York state department of health, has been assigned to Buffalo to supervise the operation of water and sewage plants in seven of the western counties of the state. Previous to his engagement last summer by the New York health department, Mr. Allen was city health officer of Coral Gables, Fla.

CLARE A. PARKS has been placed in charge of the office in Seattle of the Asbestos Bureau, Inc., which includes in its membership the foremost asbestos firms in the Pacific Northwest. In addition to managing the bureau affairs, Mr. Parks will have charge of quantity surveys in connection with the use of asbestos and asbestos prdoucts in building construction.

MALCOLM C. CLEVELAND, of New York City, has been appointed chief engineer of the New York state public service commission, succeeding Charles R. Vanneman, who has resigned to enter private practice. Mr. Cleveland has been engaged in engineering work for more than 30 years, since 1914 with the Lehigh Valley Railroad and for the last two years assistant chief engineer of that road.

SOCIETY CALENDAR

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; summer meeting, Tacoma, Wash., July 8-10.

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia; 34th annual meeting, Chicago, June 22-26.

AMERICAN WATER WORKS ASSOCIATION, New York; annual convention, Pittsburgh, Pa., May 25-29.

AMERICAN CONSTRUCTION COUNCIL will hold its eighth annual spring meeting in New York City on May 11. Besides home modernization, subjects to be discussed include "Building Financing and Its Relations to Business and Public Welfare," "Stabilization of Employment Through Quasi-Public Works" and "The Practical Obstacles to Slum Clearance."

ILLINOIS SECTION, American Water Works Association, met at Bloomington, April 28 and 29. Drought effects on Illinois water supplies, developments in taste and odor removal and the economics of water softening were given special attention. Papers prepared by the sanitary engineering division of the state department of health and the state water survey indicated that the condition of depleted water supplies due to the prevailing drought had been relieved somewhat from its critical condition a few months ago but that it would be some time before all danger was past. A. M. Buswell outlined a soap-waste survey now being carried on in Chicago Heights by an economist from the University of Illinois. The survey is being done with the cooperation of the wholesale and retail purveyors of soap. For the ensuing year Charles B. Burdick will be chairman of the section, John R. Baylis vice-chairman, and J. J. Doland, of the University of Illinois, will continue as secretary.

INDIANAPOLIS BUILDING CONGRESS, composed of general contractors, architects and material supply men, has elected Robert Frost Daggett president for the third consecutive year. Other officers are: vice-presidents, Gerry M. Sanborn, Leslie Colvin and S. P. Meadows; secretary, G. E. Pierson; treasurer, E. J. Wuench.

MID-SOUTH SECTION, American Society of Civil Engineers, at its meeting in Memphis on April 30 elected the following officers: president, Harry N. Howe, Memphis; vice-presidents, for Tennessee, L. D. Worsham and H. A. Wiersema, both of Memphis; for Arkansas, L. P. Parmelee, Helena, and R. E. Warden, Little Rock; for Mississippi, G. R. Clements, Vicksburg, and L. W. Mashburn, Clarksdale. The meeting was addressed by Francis Lee Stuart, president, and George T. Seabury, secretary, of the national society.

NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS will hold its fourth annual convention in New York City on May 16. All licensed professional engineers and land surveyors are invited.

NEW YORK STATE SEWAGE WORKS ASSOCIATION will hold its spring meeting at Freeport, L. I., on June 5-6. This will be the first two-day meeting of the association and the first to offer extensive entertainment to the ladies. An attractive program of technical papers has been arranged.

NATURAL GAS DEPARTMENT, American Gas Association, will hold its annual convention May 11-14 in Memphis, Tenn. Men prominent in the industry are on the program.

NEW ENGLAND SEWAGE WORKS ASSOCIATION held its annual meeting in Hartford, Conn., on April 27, with about a hundred members and guests present. Besides laboratory work demonstrations by R. S. Lamphear and C. C. Carson, papers were read on sewage chlorination by L. H. Enslow, on settling tanks by R. S. Rankin, and on the sewage-works of South Manchester, Conn., by L. H. Geer. A visit was made to the South Manchester plant. The following officers for 1931 were elected: president, Warren J. Scott, director, bureau of sanitary engineering, Connecticut state department of health; vice-president, Roy S. Lanphear, chemist, Worcester sewage-works; secretary-treasurer, F. Wellington Gilcreas, of Weston & Sampson, Boston. The next meeting of the association will be held in the fall at Providence, R. I.

PENNSYLVANIA SEWAGE WORKS ASSOCIATION will hold its fifth annual conference at State College, Pa., June 23-24. An interesting program of papers has been prepared. L. D. Matter, Wilkes-Barre, Pa., is secretary.

TWELFTH INTERPROVINCIAL CONFERENCE on highway and allied problems, sponsored by the Canadian Good Roads Association, will be held in Ottawa, May 20 and 21. Among the subjects to be discussed will be federal aid for highways and for railway grade-crossing elimination; uniformity of traffic codes for all the Canadian provinces; urban responsibility for rural highway construction and maintenance; dustlayers for gravel roads; international reciprocity in recognition of license registration and plates, and education of all users of the highway in the interest of public safety.

Obituary

ROBERT R. CENEK, a contractor of Gary, Ind., builder of some of the largest apartment houses in that city, died recently of typhoid fever.

P. BREWER, senior member of the contracting organization of Brewer & Brewer Sons, died at his home in Chillicothe, Ohio, on April 13. Mr. Brewer was a native of Ross County, Ohio, where he had spent a large part of his life. He had been actively engaged in highway and paving construction for nearly 40 years.

WALTER GRAEME ELIOT, former park commissioner of the borough of Queens, New York City, died on May 3 at the home of his son in San Antonio, Tex., at the age of 73. Mr. Eliot was a graduate of Columbia University. He was the author of the first bill in the New York legislature to license professional engineers and from 1921 to 1930 was a member of the New York state board of licensing for professional engineers, becoming chairman in 1925. He was also a founder of the Society of Municipal Engineers of New York.

ROSS MALCOMB STUBBS, bridge engineer of the Missouri-Kansas-Texas Railroad, died suddenly in a hospital in St. Louis, where he was undergoing treatment for what was supposed to be a minor ailment. Mr. Stubbs was born in 1886 in Terre Haute, Ind., and was graduated in civil and electrical engineering from Rose Polytechnic Institute. He began service with the M-K-T in 1918 as assistant bridge engineer and in the following year was appointed bridge engineer at Dallas, Tex., and a year later was transferred to St. Louis. Prior to his connection with the M-K-T Mr. Stubbs had been assistant bridge engineer for the Vandalia Railroad.

Construction Equipment and Materials

Drill Steel for Hoover Dam

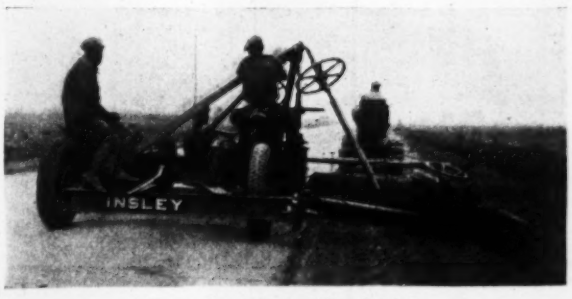
Drill steel requirements for the construction of the Hoover Dam, including the four 50-ft. tunnels through the walls of Black Canyon, have been ordered from the Crucible Steel Company of America, New York City, by Six Companies, Inc., the contractor. The quantity required will be about 1,000 tons. This order is believed to be the largest ever placed for rock drill steel.

Shoulder Finishing Device

The National Equipment Corp., Milwaukee, Wis., has announced a new shoulder finisher designed and built by the Insley division, the purpose of which is to shape a road shoulder and berm accurately once the proper amount of dirt has been put in place. It consists of a platform mounted on pneumatic tires, this platform carrying an A-frame and column supporting a set of blades which conform to the required specifications. It is made with three sizes of blades, 8 ft., 10 ft. and 12 ft. 6 in., and can finish any shoulder from 5 ft. to 11 ft. wide. The main blade is adjustable vertically at both ends, and also in a horizontal plane. The slope blade is adjustable as to both angle and length.

A unique feature of the Insley shoulder finisher is the use of a guide bar near the rear which runs along the edge of the finished slab and holds the entire machine in exact line so that the relation of the edge at slab to the edge of the berm is automatically maintained. When the machine is used on other than a concrete slab this guide bar is not used. The fact that it has steerable wheels enables the operator to line up with the edge of the pavement by means of an indicator and thus get the same result that he gets on a slab job. Owing to the distribution of the weight the shoulder finisher can carry a full blade either with or without the assistance of the guide bar.

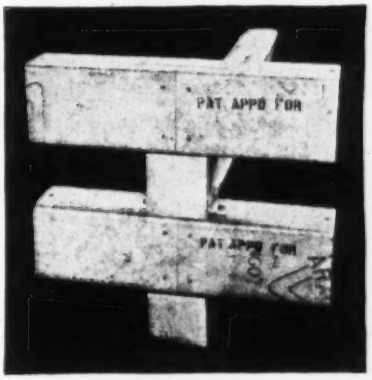
The usual procedure in building shoulders with this machine is to put an oversupply of dirt on the shoulder and make a rough cut. This operation is then repeated, bringing the shoulder down to the finished grade and turning the angle of the berm. The machine is pulled by a tractor running on the shoulder rather than on the slab, making it possible to finish shoulders closely behind the paver.



Rear view of shoulder finisher

Cribbing for Retaining Walls Made of Sheet Metal

Standard galvanized sections of Armco ingot iron cribbing for retaining walls have been announced by the American Rolling Mill Co., Middletown, Ohio, and are being distributed through the Ingot Iron Railway Products Co., also of Middletown. The standard sections, with lengths of 6 or 8 ft., are held together by a sturdy interlocking device. Galvanized metal filler plates are used when closed-face walls are desired. Uses for the new product are expected to include railroad and highway retaining walls, bridge wing walls, river and harbor bank protection work and underwater crib foundations. It is expected to be exceptionally useful for emergency installations, as standard sections can be stocked for an indefinite period, and their lighter weight will facilitate rapid transportation, handling and installation when washouts or slides occur.



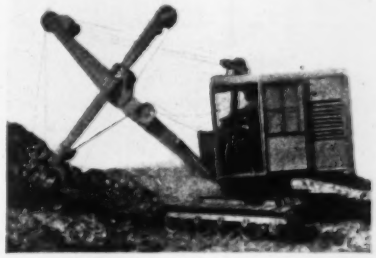
Elements of metal retaining wall

Header sections, shortened in this illustration, are ordinarily 6 ft. in length. Spreaders are 8 ft. long.

Walls constructed of metal sections are said to weigh only one-quarter as much as other designs, and can therefore be placed on foundation soils which would require more elaborate treatment for a heavy mass wall. Settlement of the soil will not crack the wall when properly erected, and there is no necessity for a curing period during construction. No special equipment is required for handling or erection, as the work can be done by unskilled labor. Temporary installations can be dismantled and relocated without loss. The height of the wall can also be increased, if necessary.

Convertible ½-Cu.Yd. Excavator

Quality materials assembled in a simplified design, with particular attention paid to accessibility for adjustment or repair, are notable features of the new model 55 fully convertible shovel of ½-cu.yd. capacity which has been announced by the Austin Machinery Corp., Muskegon, Mich. The main member of the lower frame is a one-piece steel casting to which are riveted two heavy-duty H-beams supporting the multi-pedal or crawler treads. An external-type ring-gear is used which is cast integral with the track circle, having an inverted U-section for greater strength. The track circle is rigidly riveted and electric welded to the top of the lower frame casting. Power is relayed from the upper frame through a vertical traction shaft and bevel gears to the lower traction shaft, thence to drive sprockets on the multi-pedal shafts through heat-treated steel roller chains. Independent jaw clutches with automatic brakes are provided for each multi-pedal unit. There is also a traction brake. The multi-panels, or crawlers, are of the self-cleaning type and are equipped with compression springs to eliminate any damage from stretching of the track when passing over obstacles.



½-cu.yd. gasoline shovel

All main machinery is assembled on the upper frame casting, a high-grade one-piece cast-steel revolving frame with channels riveted on either side. This, in turn, is supported by four rollers, which are bronze bushed. Drag and hoist drums are mounted on a single manganese alloy shaft with oversize radial roller bearings. The main drive shaft carries the reverse clutches and bevel gears and is mounted in ball bearings. Reverse clutches are 16-in. diameter Twin Disc gear-driven type, with split driving plates which can quickly be renewed without removing the shaft. These clutches provide reverse action for swing, traction and boom hoist. The engine drive pinion is directly connected to the main drive shaft by a high-speed silent chain completely inclosed and run-

(Continued on page 786)

Current Construction Unit Prices

Vitrified Sewers for Braintree, Mass.

EAST BRAINTREE, MASS., let contract in February, 1931, for laying in open cut 15,250 lin.ft. 8- to 36-in. vitrified sewers to depths 8 to 12 ft. The pipe and fittings, cast-iron pipe, manhole frames and other ironwork to be permanently built into the work is furnished by the sewerage committee f.o.b. cars at the local freight yard of the New York, New Haven & Hartford R.R.

All joints are made with asphalt jointing compound furnished by the contractor. First a gasket of jute is rammed into the joint space, leaving a depth for the compound of 1½ in. in 6- to 15-in. pipe to 3 in. in 36-in. pipe. Subdrains are laid below the bottom of the sewer trench where indicated.

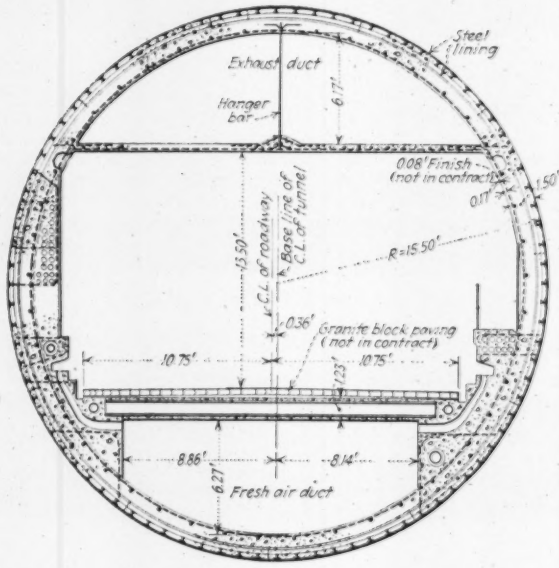
Sixteen bids were received and contract was let to the second lowest bidder. Contract unit prices are given and the average prices of this bidder and the next three. These total bids were $97,153, $97,321, $97,620 and $97,632. Contractor is L. Balboni, 78 Metropolitan Ave., West Roxbury, Mass. Frank A. Barbour, Tremont Building, Boston, is consulting engineer. The prices on this contract are typical of those on the three other sections, 1, 5 and 6.

Excavation:	Contract	Average Low Four
16,950 cu.yd earth, 0-8 ft.	$1.80	$1.70
1,200 cu.yd. earth, 8-12 ft.	4.00	3.19
580 cu.yd. earth, below 12 ft.	5.00	4.25
1,380 cu.yd. rock, 0-8 ft.	6.00	5.75
Vitrified pipe, laying only:		
4,670 lin.ft. 8-in.	.25	.40
850 ft. 10 in.	.40	.71
670 ft. 18-in.	1.00	1.25
440 ft. 24-in.	1.00	1.75
2,720 ft. 27-in.	2.00	2.38
1,440 ft. 30-in.	2.00	2.25
4,460 ft. 36-in.	2.00	2.38
11,950 lin.ft. 5-6-in. drains	.30	.31
600 ft. 8-in. c.-i. main	1.00	1.13
205 cu.ft. brick masonry	35.00	27.75
1,830 cu-ft. concrete masonry	8.00	7.25
	$97,153	$97,432

Boston Traffic Tunnel, $5,696,510

SECTION A of the Boston traffic tunnel extends from North Square in Boston to the corner of Decatur and London Sts. in East Boston, a distance of 4,875 ft. Contract was awarded March 10, 1931, to the Silas Mason Co., Inc., for $5,696,510. The steel and concrete tunnel is to be circular, 31 ft. in diameter with a 21½-ft. roadway providing for traffic in both directions. It is on a straight line 1,575 ft. long in Boston, 1,550 ft. under the harbor and 1,750 ft. long in East Boston. Grade on the Boston side is 4.2 per cent, under the harbor 0.5 per cent and in East Boston 3.2 per cent. Bottom under the middle of the harbor will be 85 ft. below mean low water. Construction will be by the shield method, compressed air being used where needed.

The material, as shown by numerous borings throughout the length of the site, is fill, hard yellow clay underlain with blue clay, and some sand and gravel below. Estimated

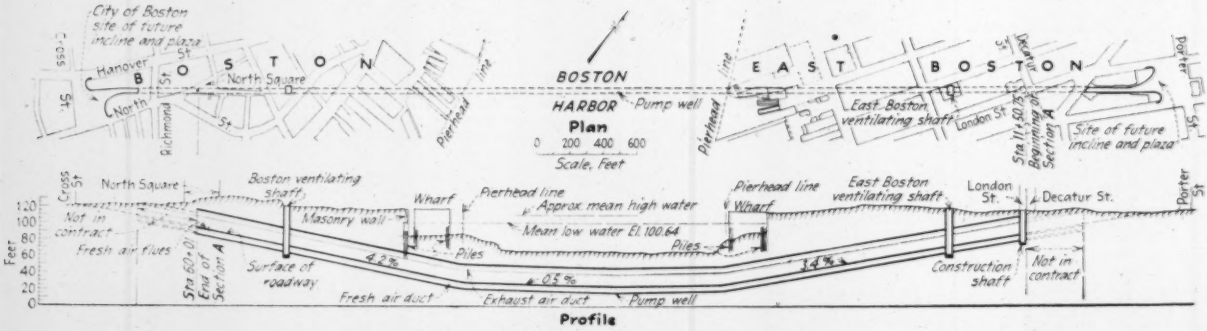


Typical cross-section

volume is 240,000 cu.yd. Half of this is in tunnel made by means of the shield designed and furnished by the contractor. Much of the material will be deposited and graded at the airport at East Boston; the remainder must be disposed of by the contractor. The low bid is $20 per cubic yard for all excavation.

The present contract covers the middle or submarine part of the tube, but not the two approaches. All piping, conduit and inserts are included; pavement, tiling, ceiling finish, ventilating and draining equipment and electric wiring are excluded.

Concrete totals 36,500 cu.yd. It will be used for tunnel ring, roadway slab, walk, floor of foul air duct, bulkheads and shafts. Of the total, 34,000 cu.yd. will be mixed as follows: To each 376 lb. of cement will be added 9 cu.ft. sand, 15 cu.ft. crushed stone and 6½ gal. water. Small-stone concrete will also be mixed as described, except that the coarse aggregate is ⅜- to ¾-in. crushed stone. The latter is for use where reinforcing rods are close together, around structural steel beams, columns and other steel and iron members, and around ducts. Mortar will be mixed 376 lb. cement to 8 cu.ft. sand. Cinder concrete is 94 lb. cement to 5 cu.ft. sand and 10 cu.ft. soft-coal cinders. Granolithic wearing surface, 1 in. thick, is composed of 4 cu.ft. sand to 376 lb. cement. The 6,000 cu.yd. of grout, consisting of 1 part high-early-strength cement to 4 parts sand, will be pumped dry under pressure up to 100 lb. into the space between the steel lining and the soil surrounding the tunnel. After the steel ring has been completed and air pressure removed



Profile

Plan and profile of Boston traffic tunnel

liquid neat grout will be forced into the grout pipes. Cast-iron pipe will be used for water and drain pipe.

The lining will consist of segments made up of rolled or pressed steel shapes to form a perfect circle made watertight by welding. Before erection, the sides and ends of the segments are to be given a coat of roofers' putty. All segments except the key and those of taper rings will be interchangeable.

Five bids were received as follows: A, Silas Mason Co., Inc., 52 Vanderbilt Ave., New York, $5,696,510; B, George R. Cooke Co., 1216 Penobscot Bldg., Detroit, $6,166,082; C and R Construction Co., Roslindale, Mass., $7,623,121; Patrick McGovern, Inc., New York, $8,761,790; Coleman Bros., Inc., Boston, $9,424,603. The work is under the general supervision of the Boston Transit Department, of which Thomas F. Sullivan is chairman, Ernest R. Springer chief engineer and L. B. Howe designing engineer.

	A	
140,000 cu.yd. excav. in tunnel	$20.00	$17.25
140,000 cu.yd. excav. not in tunnel	20.00	14.50
34,000 cu.yd. concrete	20.50	30.00
2,000 cu.yd. small stone concrete	20.50	30.00
250 cu.yd. mortar	25.00	15.00
200 cu.yd. cinder concrete	30.00	12.00
1,300 sq.yd. granolithic surface	2.00	2.00
6,000 cu.yd. 1:4 grout	10.00	20.00
1,000 cu.yd. neat grout	10.00	50.00
14,000 lin.ft. C.-i. pipe, 6-in.	1.50	3.00
2,000 ft. c.-i. pipe, 8-in.	2.00	4.00
12,000 tons steel lining	113.00	130.00
1,200 tons structural steel	95.00	100.00
2,000 tons reinforcing rods	80.00	100.00
8 tons hanger rods	900.00	1,000.00
50,000 sq.ft. wire cloth	.05	.20
12,000 sq.yd. waterproof fabric	.40	1.00
57,000 ft. 3-in. fiber duct	.20	.30
19,000 ft. ¾-in. steel conduit	.25	.25
6,000 ft. 1¼-in. steel conduit	.50	.45

Wood Pile Pier With Concrete Deck, New York

CONSTRUCTION of pier new 34 over the vehicular tunnel under the Hudson River, New York City, was described on p. 275 of the Aug. 14, 1930, issue. Allen N. Spooner & Son, Inc., was the contractor, and the price was $792,037. Pier new 32 is now to be constructed under contract 2001 by J. Rich Steers, Inc., on a low bid of $448,275. The work is in four classes: (1) removal of existing structures; (2) dredging and disposal of material; (3) depositing riprap and filling; (4) building the pier. The location is shown in Fig. 1.

Removal work, shown in the plan, consists of piers old 31, 32 and 33, with their sheds. Order of procedure is determined by the engineer. All piles are to be pulled.

The areas to be dredged are two parallel strips each 900 ft. long by 44 ft. wide. Depth is 38 ft. below mean low water, and the estimated amount of material is 135,000 cu.yd. of mud, hard bottom, riprap, submerged wrecks and piles. The average bid is 33c. per cubic yard for a total of $45,000, with the low bid 20c. and the contract price 31.3c. Bids on similar work for pier new 34 averaged 66c. for $18,000 worth of work, with a low bid of 47c. and the contract price 58c.

New pier 32 will be 1,020 ft. long by 125 ft. wide. Its type is reinforced-concrete deck laid over cross-caps, supported on wooden piles, except the outer end which includes a ranger system. Work also includes the construction of two 6x8-ft. and one 5½-ft. concrete sewers across the existing bulkhead wall.

Beginning at the second transverse pile row from the bulkhead, every alternate pile is braced at each end with one inclined pile on the inshore side. There are 101 rows, including the double row at the extreme end of the pier, and 27 piles per row, including a 60-ft. oak fender pile at each end. The rows are capped with 12x12 timbers butt-jointed, with each joint held on each side by a 6x12-in. fishplate 4 ft. long. Column foundations are provided by 48 rows of pile clumps, 25 piles per clump and two clumps per row. The sections, Figs. 2 and 3, indicate the construction of the pier.

The pier deck is a steel reinforced-concrete slab 10 in. thick. The surface is screeded, rammed and broomed. The full length of the deck for a width of 6 ft. from the inside edge of the side ranger is troweled. At each shed column location, recesses are formed for column bases. The deck is built in alternate transverse strips as wide as the distance between center lines of adjacent pile rows. The joints are always located on the center line of a pile row.

Eleven bids were received, averaging $539,000, with the low $448,275, or 17 per cent below the average. The complete list of bids is given in the table.

Name	Class 1 Removal	Class 2 Drg. 135,000 Yd.		Class 3A Riprap 42,000 Yd.		Class 3B Earthfill 18,500 Yd		Class 4 Pier New 32	Total
J. Rich Steers, Inc.	$46,000	31 3-10c	$42,255	1.10	$46,200	10c.	$1,850	$311,970	448,275
Allen N. Spooner & Son, Inc.	54,853	20c	27,000	1.25	52,500	15c	2,775	362,128	499,256
George W. Rogers Construction Corp.	65,000	28c	37,800	1.25	52,500	25c	4,625	352,025	511,950
Frederick Snare Corp.	54,017	31½c	42,525	1.10	46,200	10½c	1,942	371,119	515,803
General Contracting & Engineering Co.	67,749	30c	40,500	1.45	60,900	10c	1,850	360,798	531,797
George B. Spearin, Inc.	67,100	28c	37,800	1.10	46,200	10c	1,850	380,800	533,750
Tilt-Hargan Co.	53,950	31½c	42,525	68c	28,560	31c	5,735	405,000	535,770
P. T. Cox Contracting Co.	52,570	34c	45,900	1.37	57,540	55c	10,175	421,624	587,809
Arthur I. Kraft, Inc.	26,000	33c	44,550	1.50	63,000	60c	11,100	470,000	614,650
A. M. Hazell, Inc.	55,125	53c	71,550	1.65	69,300	25c	4,625	446,500	647,100
Stillman-Delehanty-Ferris Co.	60,000	45c	60,750	2.50	105,000	50c	9,250	475,000	710,000
Average, 11 bids	55,000	33c	45,000	1.36	57,000	27½	5,100	397,000	539,000
Per cent of total cost	10		8		10		1	71	100

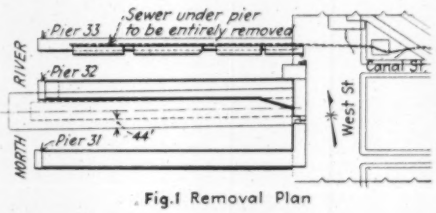


Fig.1 Removal Plan

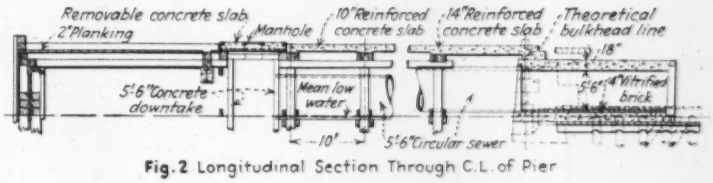


Fig.2 Longitudinal Section Through C.L. of Pier

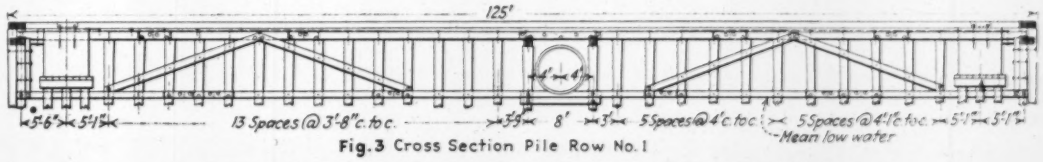


Fig.3 Cross Section Pile Row No. 1

Construction of pier new 32 at foot of Canal St., North River, N. Y.

½-Yd. Excavator

(Continued from page 783)

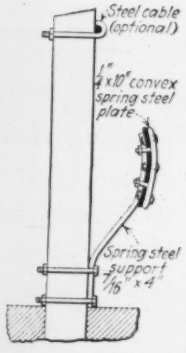
ning in oil. Power is provided by a Waukesha four-cylinder heavy-duty motor developing 50 hp. at 1,050 r.p.m.

On the shovel unit the boom hoist is operated by a self-locking worm and worm gear and is disengaged except when in use. The boom itself is of structural steel riveted into a rigid unit to form a box girder. This is attached to the upper frame of the machine by pins in multiple shear, and is braced by heavy tie-rods. Boom suspension is by a four part line. The standard length is 16 ft. 6 in. For crowding, a two-line control is used, one line controlling the hoist and crowd while the other retracts. Twin dipper sticks are made up in two sections straddling the boom, each consisting of an oak filler armored with steel. No rivets or bolts are used, all fabrication being by electric welding. The standard length is 12 ft. A single piece of manganese alloy steel casting makes up the dipper, which has a working capacity of ½ cu.yd.; struck measure 11 cu.ft. The dipper door, a heavy steel plate, is held in closed position by a door latch and keeper of manganese alloy steel.

Other attachments available for this excavator include a trench hoe with a maximum digging depth of 15 ft. and a bucket 42 in. wide, of ½-cu.yd. capacity; and booms for crane or dragline service of the lattice box-girder type, with length at 25, 30 or 35 ft. A fairlead is provided with dragline or backfilling attachments.

Highway Guard of Spring Steel

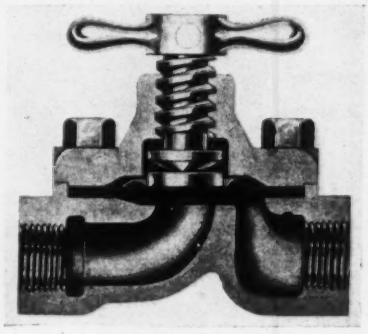
Designed to deflect rather than to stop, and to send vehicles on their way without damage to car or occupant, a new and unusual highway guard is being produced by the Tuthill Spring Co., 760 West Polk St., Chicago, Ill. The principal component of this guard is a convex steel plate with a smooth, curved surface which is placed at the proper height to receive impact from bumpers, hub caps, wheels or running boards, thereby eliminating damage to body or fenders. This rail is attached to standard posts by a spring support which acts as a bumper, preserving both vehicle and post from damage. The support is attached to the post at the base, where the post is strongest. Joints in the rail are secured by countersunk bolts so that there are no projecting parts to scratch or mar the finish of the car. As an additional safeguard, a steel cable may be connected through the tops of the posts in the usual manner.



Spring road guard

Stop Cock for Air Lines

Quick, positive and tight closure of air lines in industrial plants is the function of a new type of stop cock developed by the Westinghouse Traction Brake Co., Wilmerding, Pa. The distinctive feature of this device is a flexible diaphragm which acts as a valve to open and close the passageway through the cock. This diaphragm is clamped between the body and cap and is provided with an annular rib adapted to engage a seat on the body. When the diaphragm is in its upper position the passageway through the cock is open. When the operating handle is turned clockwise, the threaded stem, through the medium of a pressure plate, forces the diaphragm to its seat. Only a slight pressure on the screw is required to effect a bottle-tight closure. If it is desired to exhaust air from the delivery side when the cock is closed, a vent passage may be provided. In this case leakage from the vent when the cock is in open position is prevented, because the diaphragm seals on the cap and closes the passage. It will thus be evident that this device may function both as a supply valve and as a release valve. The only upkeep involved is an occasional replacement of the diaphragm, which is a simple and inexpensive operation. This diaphragm is made of Wabco composition, a special material developed by the Westinghouse company which is tough, non-porous and impervious to oil and moisture. Cocks are now available for pipe sizes from ⅛ to 1 in.



Section through stop cock

Centrifugal Pumps Assembled of Standard Units

Prompt shipment of any of 150 pumping combinations is promised by Goulds Pumps, Inc., Seneca Falls, N. Y., because of an unusual method of assembly. From a limited stock of parts comprising eleven standard pump units with changeable impellers and nine universal bedplates for mounting any size motor from ¼ to 50 hp., and with speeds of from 1,450 to 3,450 r.p.m., the company will make up pump units with capacities from 10 to 1,100 gal. per hour at heads up to 350 ft. Each of the 150 combinations, according to the company, will be equal in efficiency and performance to a custom-built centrifugal pump.

New Publications

Belt Drive—Specifications and prices of standard short-center lap belt drive for transmitting up to 50 hp. at 1,750 r.p.m. are given in a 40-page catalog of the ROCKWOOD MFG. CO., Indianapolis, Ind.

Air Compressor Accessories—WESTINGHOUSE AIR BRAKE CO., Wilmerding, Pa., has reissued descriptive catalog T-2035 covering its complete line of accessories for use with Westinghouse steam and motor-driven compressors in the industrial field.

Concrete Admixer—Properties, sources and technical uses of "Ayr Syl" diatomaceous silica as an admixture for concrete are discussed in a pamphlet issued by the INDUSTRIAL CHEMICAL SALES CO., INC., 230 Park Ave., New York City.

Truck Mixers—Information regarding the design and use of the Jaeger truck mixer are given in a 20-page catalog TM-31, issued by the JAEGER MACHINE CO., Columbus, Ohio.

Well Points—A comprehensive 58-page illustrated catalog, explaining the possibilities and accomplishments of the Moretrench wellpoint systems has been published by the MORETRENCH CORP., Rockaway, N. J.

Explosives—E. I. DU PONT DE NEMOURS & CO., Wilmington, Del., have reissued in revised form a chart listing the various brands of du Pont explosives and the uses to which they are adapted.

Sewage Disposal—Efficient sewage disposal for isolated buildings by the Aten system is the subject of a 20-page illustrated bulletin issued by the ATEN SEWAGE DISPOSAL CO., 286 Fifth Ave., New York City.

Heavy Grading Equipment—R. G. LE TOURNEAU, INC., Stockton, Calif., has issued a 20-page descriptive catalog of heavy grading machinery, including carts, scrapers, bulldozers, rooters, rollers and power-control units.

Rails—An unusually complete 124-page illustrated catalog, covering rails, track accessories and track tools, and containing considerable track engineering data, has been published by the L. B. FOSTER CO., INC., Pittsburgh, Pa.

Welding Rods—Physical qualities and methods of applying Timang air-toughening steel welding rods are explained in a 4-page pamphlet issued by the TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

Crawler Tractor—Specifications and uses of the Model GH Trackson McCormick Deering heavy-duty crawler tractor are covered in a 4-page folder, 304, prepared by the TRACKSON CO., Milwaukee, Wis.

Power Excavators—New catalogs have been published by the SPEEDER MACHINERY CO., Cedar Rapids, Iowa, covering, respectively, the whirlwind ¾-yd., the B-3 ½-yd. and the model 90 1¼-cu.yd. convertible excavators. All three publications are fully illustrated.

Snow Plows—A 44-page illustrated catalog, issued by the LA PLANT-CHOATE MFG. CO., INC., Cedar Rapids, Iowa, gives specifications and construction details on a large variety of snow-removal equipment manufactured by the company.

Pipe Construction—Railings, fences and special construction using pipe and fittings as the essential construction material are described in a 76-page illustrated catalog issued by the VULCAN RAIL & CONSTRUCTION CO., Maspeth, N. Y. Detailed drawings and photographs show a large number of unusual jobs carried out by the company in various parts of the country.

Ready-Mixed Concrete Plants—STEPHENS-ADAMSON MFG. CO., Aurora, Ill., has published a 10-page illustrated booklet, describing conveyors, elevators, hoppers and batching equipment for central proportioning and concrete-mixing plants. The book contains diagrams of typical plant arrangements and features a new automatic photoelectric cell control for increasing the accuracy and economy of concrete mixtures.

Well Pumps—Bulletin 71-J of the SULLIVAN MACHINERY CO., 400 North Michigan Ave., Chicago, Ill., treats of air-made wells and Sullivan air-lift pumping. This method combines the special well-construction engineering of the Air-Made Well Co. of Kansas City, with Sullivan air-lift equipment and methods. It has proved successful in many cases in developing a water supply from shallow sand and gravel strata.

Business Side of Construction

Contract Volume Shows Some Acceleration

Contracts for the first four months total $980,000,000, compared with $1,132,000,000 in 1930. Thus the lag behind last year's volume is only 13 per cent, against 20 per cent a month ago.

Public construction is 27 per cent ahead of last year's total; a month ago 24 per cent ahead. The street and road total is 32 per cent ahead of last year's volume, and amounts to 39 per cent of public works volume, compared with 37 per cent in 1930. Other classes in the lead during the month are waterworks, sewers, bridges and federal government.

Public utility work and other private structures exclusive of buildings totaled $148,000,000, a drop of 23 per cent. The building total is $604,000,000, and was $880,000,000 in 1930. That the decline is no greater is due to increasing activity in the residential field, where this year's volume almost equals that of last year. The drop in industrial and commercial building is 44 per cent.

Exactly half of the 48 states record larger volumes than last year. These states are: New Hampshire, Massachusetts, New Jersey, Delaware, West Virginia, North Carolina, South Carolina, Georgia, Florida, Mississippi, Louisiana, Indiana, Illinois, Arkansas, South Dakota, Nebraska, Texas, Oklahoma, Montana, Wyoming, Idaho, Utah, Arizona and Nevada.

In April contracts were let at the rate of 63.5 millions per week, compared with 76 millions in April, 1930. The proportion of public works was 55 per cent of the total for the month, compared with 43 per cent in April, 1930.

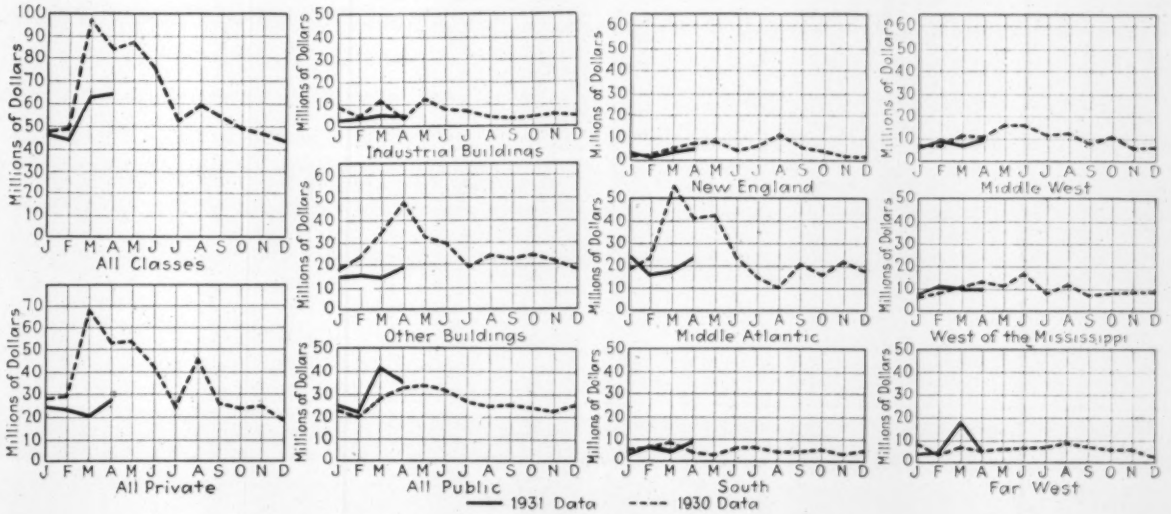
Materials Prices Continue Down

Prices have continued to sag for a number of months, though there has been a scattering of advances in brick, lumber, aggregates and tile wherever there was sufficient buying to encourage a rise. This is an indication of what would happen to prices in the event of a revival in demand for construction, and a proof that prices are low. The feature of the market continues to be cement. During the month a number of drastic reductions took place in an area wide enough to include Baltimore, Dallas and Seattle. These reductions amounted to 85c. in Baltimore, 54c. in Pittsburgh, 27c. in Dallas, 35c. in Kansas City and 55c. in Seattle. New York also has felt the effect of the price war, bitterest in the Middle West, and the present price is $1.95, compared with $2.10 on April 1, $2.20 in May, 1930, and the previous low of $1.82 in 1918. The current production rate is 37 per cent of the 260,000,000-bbl. capacity, compared with 52 per cent at the end of the first quarter of 1930.

Improvement is shown in the brick

ENGINEERING CONSTRUCTION CONTRACTS REPORTED IN APRIL, 1931
Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States			Canada, April 1931
							April, 1931	Four Months		
								1931	1930	
Water-works	$5,407	$344	$150	$1,890	$2,303	$125	$10,219	$21,302	$16,519	$677
Sewers	545	4,898	93	1,241	510	440	7,727	27,149	24,657	227
Bridges, public	208	3,863	1,874	1,203	2,177	591	9,916	33,573	33,415	457
Excavations	128	425	266	234	90		1,143	6,941	7,780	125
Streets and roads	5,518	15,437	15,494	15,718	19,025	10,431	81,623	211,313	160,339	4,921
Federal government	5,349	2,408	9,854	3,096	3,062	2,620	26,389	117,761	41,273	
Unclassified, public	428	7,104	13	366	144	159	8,214	40,228	41,492	453
Buildings, public	1,580	18,755	3,150	4,557	1,544	1,258	30,844	87,105	103,968	1,090
Total public	19,163	53,234	30,894	28,305	28,855	15,624	176,075	545,372	429,943	7,950
Buildings, industrial	1,596	14,524	957	1,614	3,419	855	22,965	67,785	125,239	1,740
Buildings, commercial	6,274	32,846	1,419	18,064	3,275	5,566	67,444	218,320	389,132	750
Bridges, private		50					50	305	5,372	
Unclassified, private	1,257	17,213	9,600	2,915	12,161	7,225	50,371	148,206	181,860	2,200
Total private	9,127	64,633	11,976	22,593	18,855	13,646	140,830	434,616	701,603	4,690
April total, 5 weeks	**28,290**	**117,867**	**42,870**	**50,898**	**47,710**	**29,270**	**316,905**			**12,640**
March, 1931, 4 weeks	16,518	72,373	19,220	29,564	39,745	69,926	247,346			9,688
April, 1930, 4 weeks	25,200	137,648	19,748	50,200	47,804	24,789	305,389			11,448
Four months, 1931	63,839	368,464	101,874	150,198	158,270	137,343	.....	979,988		46,109
Four months, 1930	61,340	560,633	95,860	150,121	154,003	109,589	.....	.....	1,131,546	57,081



Contracts awarded, showing trend by classes and sections

industry; May delivered prices are up 50c. at Detroit, $1.50 at Baltimore and $2 at San Francisco. There was an advance also of 50c., to $13.50, delivered at New York, which is important because of the heretofore depressed condition of the market. This increase is due to a strike in the brickyards in the Kingston district, as well as to seasonal increase in consumption.

Quite a different situation exists in the lumber market. Overproduction has demoralized mill prices. There were numerous price reductions in pine, fir and hemlock timbers. Fir 3x12s are down $1, to $17, at Seattle, and 8-in. pine is down $4, to $40, at New Orleans. There were some increases in the smaller sizes in Kansas City, Seattle and Boston. A cargo of southern Russian spruce arrived April 23 at Providence. The amount is 3,200,000 ft., the tariff $3,200, and the price $26.50 at dock, which is about the price of domestic fir.

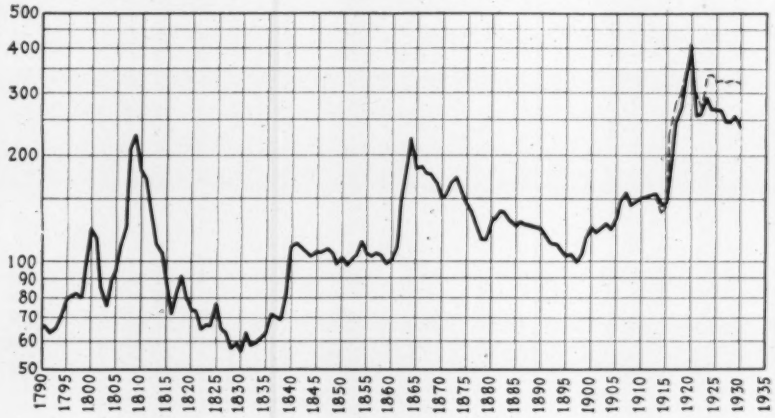
Steel production continues to decline, from 57 per cent at the March peak to the present rate of 49 per cent. Prices are unsatisfactory, nominal price for bars, plates and shapes being $1.65, Pittsburgh. Rivets continue at $2.55 at mill, but for deliveries from New York warehouses are down 25c. per keg, to $4. The scrap market is slow. Dealers claim that railroads are selling their scrap directly to melters without charging transportation. The price of heavy melting scrap is $6.50 per ton New York, as on April 1. Cast-iron pipe mills are running at 60 per cent capacity, compared with 70 per cent a year ago. Both public and public utility business is slow, the latter due to the spring municipal election season. Other branches of demand, including industrial plants, is reported satisfactory, though buying is for immediate use. Prices continue as at last reporting without any recovery from the March drop.

Building Materials Prices for 140 Years

The accompanying curve is probably the longest record of building materials prices in the United States. The period covered is 1791 to date—140 years. The data are Tooke's prices for the first 48 years, the index numbers calculated by the Aldrich senate committee for 1840-90, and the U. S. Bureau of Labor building materials index since 1890. The base (100) is 1860.

Moody's Investors' Service drew the curve, and has also plotted the *Engineering News-Record* construction cost index number over the period 1913-30.

From 1915 to 1920 materials prices and general costs to construct rose together to a new plane. Both were deflated equally in 1921, and both rose again in 1923. Labor rates thereafter remained well above material prices, the latter being brought by mass production, mill-to-job buying, and improved transportation facilities, with consequent ready supply.



140-year record of building costs—1860 = 100

The aggregate business is going strong in comparison with the general market level. Plants in Texas and Louisiana are mining 24 hours a day supplying needs for track ballasting, highway and dam construction. Prices for gravel are up 10c. per cubic yard in Seattle, 10c. to 20c. per ton in Philadelphia, 25c. per ton in Detroit and 25c. per ton in Montreal. Current loadings are 3 per cent lower than they were a year ago.

The increase in street and road work has not boosted materials prices, the trend of which is down. Paving stone was reduced 10c. per square yard at Kansas City and wood blocks are down 25c. at the same point. Wood blocks are down 10c. at New Orleans. Road oils are down 1c. per gallon at Detroit and New York. Prices of asphalt in tank cars or boats declined 50c. per ton at Boston and New York, $1 at Philadelphia, $2.44 at Detroit.

Prices of hydrated lime, finishing grade, were reduced $2 at Pittsburgh, $4 at Philadelphia and $1.75 at Montreal.

CURRENT BUILDING AND CONSTRUCTION TRADES WAGE RATES PER HOUR

Advances since last month are indicated by **heavy type**, declines by *italics*

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Pile Drivers	Structural Iron Workers	Common Labor*
Atlanta	$1.25@1.40	$0.60@.70	$0.60@1.00	$0.50	.....	$0.75@1.25	$0.25@.35
Baltimore	1.75	1.00@1.10	1.00@1.37½	1.00	$0.65	1.00@1.25	.30
Birmingham	1.25	.75	1.00	.30	.....	1.00	.25
Boston	1.50	1.37½	1.37½	.85	1.27½	1.37½	.40@.80
Cincinnati	1.62½	1.40	1.40	1.00	1.40	1.40	.35@.60
Chicago	1.70	1.62½	1.62½	.97½	1.62½	1.62½	.97½
Cleveland	1.62½	1.37½	1.37½	.87½	1.10	1.50	.35@.60
Dallas	1.75	1.12½	1.25	.35@.75	1.25	1.25	.35@.50
Denver	1.50@1.62½	1.25	1.25@1.37½	.87½@1.00	.....	1.25	.43½@.62½
Detroit	1.56½	1.00@1.25	1.00@1.10	.90	1.00@1.10	1.00@1.25	.50@.60
Kansas City	1.50	1.37½	1.37½@1.50	.90@1.00	1.37½@1.50	1.50	.25@.75
Los Angeles	1.37½	1.00	1.00	.75	.87½	1.00	.50
Minneapolis	1.25@1.30	.80@.90	.90@1.00	.80	.....	1.00@1.25	.50@.65
New Orleans	1.00	50@75	1.25	.75	.80@1.00	1.12½@1.25	.20@.35
New York	1.92½	1.65	1.92½	1.03½	1.78½	1.92½	1.03½
Philadelphia	1.75	1.25	1.02½@1.36	.70@1.12½	1.00	1.37½@1.62½	.40@.50
Pittsburgh	1.75	1.50	1.50@1.56½	1.12½	.....	1.50	.40@.80
St. Louis	1.75	1.50	1.60@1.75	1.15@1.25	1.25	1.75	.30@.87½
San Francisco	1.37½	1.12½	1.12½	.87½	1.12½	1.37½	.68¾
Seattle	1.50	1.12½	1.12½@1.25	1.00	1.25	1.25	.70
Average	1.54	1.19	1.28	0.8640	1.20	1.34	0.5394
Montreal	1.12½	.75	....	.....	.90	.75@.90	.35

*Minimum rates are mostly non-union and for construction other than buildings.

Employment Notes

Average hourly rate for skilled building mechanics is $1.35¾, the prevailing rate for the last two months. A year ago it was $1.38¼. The national average for common labor is 53.94c., compared with 53.59 a month ago and 56.28 a year ago.

Boston—Bricklayers and carpenters signed an agreement April 1 to continue under present wage schedule for next three years, with the five-day week. Sheetmetal workers continue 44-hour week at $1.37½ per hour.

New York—House wreckers' strike ended April 1, with agreement for five-day week and the old rate of $1.35 per hour for barmen and $1.25 for helpers. Board of estimate adopted resolution April 10 to push $2,000,000 bond issue for relief of unemployment, as the fund of $8,000,000 is nearly gone. The new fund will cover materials as well as labor on projects affecting streets,

docks, hospitals and other city property. Eleven thousand employees have been laid off, pending the organization of a new relief fund.

Newark—Walkout of painters on April 5 due to cut.

Camden — Effective April 6 local shipyards cut wages 10 per cent.

Philadelphia — Hoisting engineers offer to accept wage cut in order to secure an agreement with employers.

Baltimore—Building trades unions charge that contractors on two school projects are violating minimum wage law. In one instance, a wage $17 per week under prevailing rate was paid, according to the charge.

Washington, D. C.—Reorganization of United States employment service announced April 18 by secretary of labor. The new plans calls for a coordinated service extending over the entire country, one in each state, to cooperate with state and local employment authorities, and comprises seven special divisions: building trades; mining and quarrying; metal factory trades; transportation; clothing and needle trades; clerical and mercantile; seamen and longshoremen.

Pittsburgh—Contractor on $7,000,000 post office project replaced 22 union structural ironworkers April 11 with non-union piledrivers at $1.50 per hour, which is the ironworkers' rate. Building trades council charges that contractor is not paying prevailing rate on federal project and that he is seeking to establish open shop.

Cleveland—April residential work increased 50 per cent over March total.

Columbus—Bill passed by Ohio legislature April 11 outlaws contracts with employer in which worker agrees neither to join or to obtain membership in a labor union. A $50,000 gravel boulevard is to be constructed without machinery in Columbus to provide work for the unemployed.

Minneapolis—Work granted April 7 to 1,250 men on municipal projects. State highway construction will employ 2,000 men at 45c. per hour minimum. By midsummer 15,000 men will be on road work and in a few months public projects will absorb unskilled laborers. State department of administration and finance directed by the governor to require minimum scale of wages to be inserted in contracts for state work.

St. Louis—Small improvement in construction employment on road, river and railroad maintenance. Paving took 4,000 men during April, almost doubling the total already at work. Brick, tile, cement, sand and gravel plants showed gains in employment.

Helena—Governor of Montana has signed a law establishing a brick-making plant at the state prison. Bricks will be made by convict labor and are to be used within the prison limits, in order not to offer competition to free labor.

Denver—Governor of Colorado has signed bill providing for use of convict labor on state highway construction. City refuses to award contract to low bidder, who was reported to have attempted to cut carpenters' rate $3 per day, on hangar at municipal airport. Application of contractors for authority to reduce wages denied by state industrial commission.

Las Vegas (Nev.)—Laborers for Hoover Dam will be employed by the contractor, Six Companies, Inc., at its office in Las Vegas, instead of at California free employment agencies as at first proposed by the California department of industrial relations. Those who have paid their own fares to Las Vegas are slated for preference.

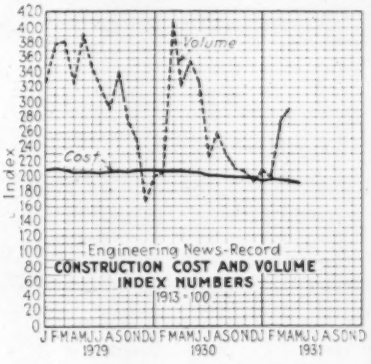
San Francisco — Sale of additional $400,000 in bonds planned to carry over city improvement program into June. Thus far 30,000 men have been given employment on municipal projects. Three hundred local contractors approve policy of maintaining wage schedules.

Montreal—Unions ask eight-hour day at 50c. per hour for city laborers, against present rate of 40c. for ten hours. City is asked to pay the same wages on construction work that it requires of contractors on public projects.

Toronto—Bricklayers' national union offers to supply men at $1.10 per hour, 25c. less than contract rate now being paid to international bricklayers' and stone masons' union. Contractors have not yet moved to break signed agreement with international.

Construction Cost and Volume Index Numbers

Cost index is lowest since November, 1922, the year of deflated prices following the 1920 peak. The drop is 2½ per cent since Jan. 1 and 9 per cent since Jan. 1, 1930. April volume was highest since June, 1930, though 6½ per cent below that of April, 1930.


Volume
Cost
Index
Engineering News-Record
CONSTRUCTION COST AND VOLUME
INDEX NUMBERS
1913 - 100
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1929
1930
1931

E. N.-R. Cost		E. N.-R. Volume	
May, 1931	**189.33**	**April, 1931**	**289**
April, 1931	191.63	March, 1931	278
May, 1930	205.86	April, 1930	320
1930 (average)	202.85	1930 (average)	260
1929 (average)	207.02	1929 (average)	317
1913 (average)	100.00		
1930		1930	
January	208.96	January	199
February	206.46	February	204
March	206.80	March	408
April	207.12	April	320
May	205.86	May	354
June	203.36	June	324
July	200.95	July	226
August	200.95	August	259
September	199.58	September	232
October	198.72	October	211
November	198.54	November	207
December	196.86	December	192
1931		1931	
January	194.48	January	208
February	196.61	February	198
March	194.51	March	278
April	191.63	April	289
May	189.33		

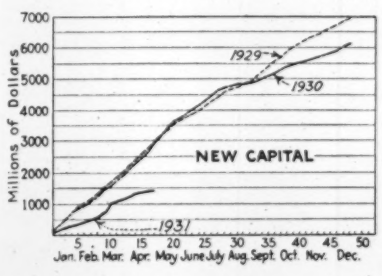
Capital and Contracts

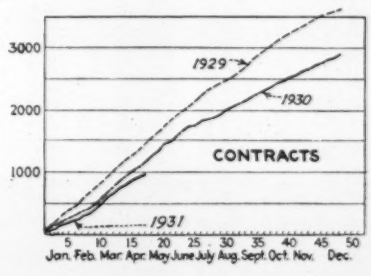
Last week made a record for new capital issued: no private and 9 millions public. The public bonds included $2,560,000 Yonkers, N. Y., 3¼ to 3½s for city improvements, and $2,285,000 Kentucky 4½s for bridge work. Financing to date is 52 per cent behind last year.

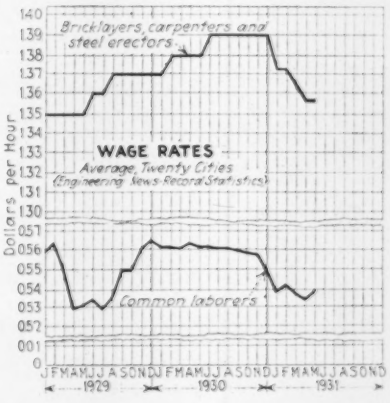
Values of contracts let in the first week of May, with some comparisons, follow:

Buildings:	May 7, 1931	Average of Last Four Weeks 1931	1930
Industrial	$2,121	$5,106	$6,014
Other	15,767	16,386	38,942
Streets and roads	12,060	14,840	15,782
Other eng. constr.	29,422	22,604	12,861
Total	$59,370	$58,937	$69,283

Total, all classes, Jan. 1 to May 7:	
1931	$1,039,358
1930	1,264,262






Bricklayers, carpenters and steel erectors
WAGE RATES
Average, Twenty Cities
(Engineering News-Record Statistics)
Common laborers
Dollars per Hour
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1929
1930
1931

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*.

Building Materials

PORTLAND CEMENT—Prices per barrel, for cement in cloth, *without including charge for four bags at 10c. each*. Cash discount not deducted. Prices are delivered by truck to contractors at site of job:

	May 7, 1931	One Mo. Ago	One Yr. Ago
Atlanta	*$2.35*	$2.60	$2.49
Baltimore	*1.75*	2.60	2.60
Birmingham	2.40	2.40	2.60
Boston	*2.20*	2.30	2.50
Chicago	*1.95*	2.10	.....
Cincinnati	*1.72*	2.26	.....
Cleveland	*1.55*	1.80	.....
Dallas	*1.88*	2.15	2.15
Denver	2.20	2.20	2.61
Detroit	2.08	2.05	.....
Jersey City	*2.09*	2.19	2.60
Kansas City	*2.15*	2.50	2.65
Los Angeles	1.92	1.92	1.92
Minneapolis	*2.15*	2.15	.....
Montreal	2.21	2.20	2.20
New Orleans	*2.34*	2.35	2.65
New York	*1.95@2.00*	2.10	2.30
Philadelphia	*2.20*	2.25	2.10
Pittsburgh	*1.96*	2.50	.....
St. Louis	*2.05@2.10*	2.15	2.45
San Francisco	2.42	2.64	2.64
Seattle	*1.70*	2.25	2.70

Current mill-prices per barrel, in carloads, without bags, f.o.b.:

Alpena, Mich	*$1.30*	Limedale, Ind	**$1.20**
Buffington, Ind	1.44	Mason City, Ia	*1.10*
Hannibal, Mo	1.66	Norfolk, Va	1.71
Houston, Tex	1.94	Northampton, Pa	1.51
Hudson, N. Y	1.61	North Birmingham, Ala	1.51
Ironton, Ohio	1.56	Steelton, Minn	1.61
Iola, Kan	*1.10*	Universal, Pa	1.46
La Salle, Ill	*1.10*	Wyandotte, Mich	*1.30*

SAND AND GRAVEL—Per ton, delivered by dealers. Weight of sand per cu.yd. 1½ tons; gravel, 1½ tons, unless otherwise specified in pounds:

	Gravel		Sand
	1½ In.	¾ In.	
Atlanta	$3.25	$3.25	$2.50
Baltimore	2.35	2.55	2.08
Birmingham, per cu.yd., 2,600 lb	1.50@2.25	1.50@2.25	1.50@2.25
Boston	*1.60@1.75*	*1.60@1.75*	*.90@1.15*
Chicago, per cu.yd	2.00	2.00	2.00
Cincinnati	*1.50*	*1.50*	*1.25*
Cleveland, per cu.yd., 3,000 lb	2.60	2.60	2.50
Dallas, per cu.yd., 2,750 lb	3.00	3.00	2.50
Denver, per cu.yd., 2,700 lb	1.95	1.95	1.35
Detroit	**2.75**	**2.25**	**2.00**
Kansas City	1.75	1.75	1.75
Los Angeles	1.90	1.90	1.40
Minneapolis, per cu.yd., 2,800 lb	1.70@2.40	1.70@2.40	.85@1.10
Montreal	**1.50**	**1.50**	1.25
New Orleans, per cu.yd., 2,700 lb	2.95	2.95	*1.80*
New York, per cu.yd.*	3.40	3.40	2.15
Philadelphia	**2.10@2.95**	**2.35@3.20**	*1.55@2.40*
Pittsburgh	1.55	1.55	1.75
St. Louis	1.40@1.55	1.40@1.55	1.00@1.20
San Francisco	1.75	1.75	1.75
Seattle, per cu.yd., 3,200 lb	**1.85**	**1.85**	**1.85**

*New York gravel weighs 2,800@3,000 lb. and sand, 2,700 lb. per cu.yd.

CRUSHED STONE—Per ton, delivered by dealers. Weight per cu.yd., 1½ tons unless otherwise specified in pounds:

	1½ In.	¾ In.
Atlanta	$3.25	$3.25
Baltimore	2.60	2.80
Boston	2.00	2.00
Chicago, limestone, per cu.yd., 2,500 lb	2.00	2.00
Cincinnati	2.25	2.25
Cleveland	2.60	2.60
Dallas, per cu.yd., 2,500 lb	3.25	3.25
Denver, granite, per cu.yd., 2,700 lb	2.50	2.50
Detroit, limestone	2.00	2.00
Kansas City	1.90	1.90
Los Angeles	1.90	1.90
Minneapolis, limestone, per cu.yd., 2,600 lb	2.40	2.40
Montreal	*1.80*	*2.00*
New York, limestone, per cu.yd	3.40	3.40
Philadelphia, limestone	2.30@3.15	2.30@3.15
Pittsburgh	3.25	3.25
St. Louis	1.40	1.40
San Francisco, trap rock	1.65	1.65
Seattle, per cu.yd., 2,700 lb	3.00	3.00

CRUSHED SLAG—Prices for carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	1.10	1.10	.....	1.30
Western Pennsylvania	1.25	1.25	2.00	1.25
Toledo, Ohio	1.10	1.10	1.10	1.00
Youngstown District	1.25	1.35	2.00	1.25

CONCRETE BLOCKS—Manufacturers' quotations on standard, 8x8x16-in., hollow, delivered to job, each:

Boston	*$0.16@$0.20*	Minneapolis	$0.11
Brooklyn and Queens	.12@ .14	New Orleans	.20
Cleveland	.16@ .17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	.17@.23
Detroit	*.10*	St. Louis	.17
Kansas City	.18		

HOLLOW TILE—Building tile per block, delivered by dealers to contractors in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x12
Atlanta	$0.14	$0.18	$0.24	$0.30	$0.36
Baltimore	.105	.....	.20	.....	.26
Birmingham	.089	.122	.167	.219	.25
Boston	**.082**	**.118**	.152	.21	.35
Chicago	.068	.0935	.1275	.1647	.183
Cincinnati	.06815	.09485	.129	.165	.184
Cleveland	.048	.066	.09	.117	.13
Dallas	.103	.136	.194	.251	.306
Denver	.0975	.135	.175	.2125	.25
Detroit	*.08*	*.11*	*.145*	*.19*	*.215*
Kansas City	.088	.11	.158	.24	.265
Los Angeles	.085	.122	.175	.232	.285
Minneapolis	.0611	.081	.10605	.1302	.1737
New Orleans	*.068*	*.094*	*.14*	*.176*	*.212*
New York	.0864	.1296	.162	.....	.....
Perth Amboy, N. J. (f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	.0545	.0765	.1035	.135	.148
St. Louis	.075	.10	.14	.175	.21
San Francisco	.108	.156	.255	.....	.....
Seattle	.085	.115	.18	.....	.....

BRICK—Prices delivered by dealers per thousand, are as follows:

	Common	Face	Paving F.O.B. 3x8½x4-In.	Paving F.O.B. 3½x8½x4-In.
Atlanta	*$11.50@$12.50*	$21.50@$23.50	$42.00	$47.00
Baltimore	13.00	25.00@ 35.00	40.00	46.00
Birmingham	**13.50**	22.50@ 27.50	26.00	28.00
Boston	*14.00*	28.75	43.00	**47.50**
Chicago	12.00	.....	42.00	45.00
Cincinnati	16.00	24.00	35.00	37.00
Cleveland	12.00@14.00	28.00	33.00	36.00
Dallas	14.50	17.50	.....	**29.50**
Denver	9.00@10.00	25.00	.....	.....
Detroit	**15.00**@15.50	25.00	35.50	37.50
Kansas City	*14.00*	.....	.....	.....
Los Angeles	**13.00**	**26.50**	.....	.....
Minneapolis	10.50	32.00	.....	.....
Montreal	**28.00**	.....	.....	.....
New Orleans	*13.00*	.....	*35.00*	*42.00*
New York	**13.50**	28.00	45.00	50.00
Philadelphia	16.00	.....	40.00	45.00
Pittsburgh	17.00	24.00	41.00	58.00
St. Louis	12.00	17.00	*35.00*	*35.00*
San Francisco	**14.00**	.....	45.00*	.....
Seattle	14.00	.....	.....	48.50

*2½x8½x4-in.

LIME—Prices delivered by dealers to job:

	Hydrated, per Ton		Lump, per Barrel	
	Finishing	Common	Finishing	Common
Atlanta	*$20.00*	*$12.50*	.....	$2.50†
Baltimore	22.00	14.00	.....	2.25†
Birmingham	22.00	16.00	$3.00†	2.00†
Boston	22.00	14.50	4.00*	3.10*
Chicago	*15.00*	14.50	15.00‡	15.00‡
Cincinnati	13.05	10.70	.....	.....
Cleveland	14.00	12.00	2.50†	2.50†
Dallas	20.00	.....	2.35†	.....
Denver	32.00	23.75	3.80*	3.00*
Detroit	14.00	12.00	.....	.....
Kansas City	19.50	.....	2.20†	.....
Los Angeles	18.90	16.00	2.85†	14.00‡
Minneapolis	25.50	21.00	.....	1.70†
Montreal	*18.00*	.....	10.00†	.....
New Orleans	25.00	*15.00*	2.65†	1.95†
New York	21.00	15.50	4.10*	3.15*
Philadelphia	*18.00*	15.00	18.00‡	14.00‡
Pittsburgh	*18.00*	15.00	4.25*	2.75†
St. Louis	*22.00*	18.00	15.00‡	15.00‡
San Francisco	20.00	20.00	.....	1.85†
Seattle, paper sacks	35.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

LIMESTONE—Blocks, f.o.b. siding, New York, per cu.ft.:

Rustic buff	$1.42	Selected gray	$1.57
Standard gray	1.47	Selected buff	1.67
Standard	1.57		

SLATE—Roofing, f.o.b., quarry, Bangor, Pa., net, per square:

No. 1 Clear	$9.00@$14.00
No. 1 Ribbon	7.50@ 10.25
Medium Clear	8.00@ 10.50

Road and Paving Materials

PAVING STONE—Carload lots of granite blocks, 4x8x4-in., dressed, f.o.b.:

Atlanta	$3.00 per sq.yd.
Baltimore	3.00 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in.	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	115@120 per M.
Detroit, 5 in.	3.00 per sq.yd.
Kansas City	*3.75* per sq.yd.
Minneapolis, 4½x8x5 in.	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in., Grade 1, 30 blocks per sq.yd	150.00 per M.
Philadelphia	125.00 per M.
St. Louis, 4x5x8 to 12 in.	3.50 per sq.yd.

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Prices, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Birmingham	3½	16	2.29
Boston	3½	16	2.25
Chicago	3½	12	1.80@2.00
Kansas City	3½	16	2.50
Minneapolis	3½	16	2.50
Montreal	4	16	4.50
New Orleans	3½	16	2.30
New York	3½	16	2.50
St. Louis	3½	16	2.10

FLAGGING—Alongside dock, New York: Manhattan and Bronx, 4 ft. wide, 24c. per sq.ft.; Queens, 5 ft. wide, 26c. per sq.ft.

CURBING—Prices per lin.ft., f.o.b., cutting charges not included:
New York: Bluestone, f.o.b. barge, 5x16-in., rough, 90c.
Birmingham: Limestone, 5x18-in., $1.05.
St. Louis: Class "B" straight, 5x16-in., 75c.; roundings, $1.05@$1.30.

ASPHALT—Paving asphalt, f.o.b., per ton. Packages are 350-lb. bbls. or 425-lb. drums, in carload lots:

	Packages	Tank-car or -boat
Atlanta	$18.50	$14.50
Baltimore	21.75	17.75
Birmingham (f.o.b. refinery)	18.00	.....
Boston	22.00	17.50
Chicago	22.50	18.30
Cincinnati	.....	12.00
Cleveland	23.00	19.00
Dallas	20.00	.....
Denver	35.00	.....
Detroit	16.68	12.43
Kansas City (f.o.b. refinery)	16.00	11.00
Los Angeles (f.o.b. refinery)	18.00	12.00
Maurer, N. J. (Bermudez)	.....	26.00
Maurer, N. J. (Trinidad)	.....	24.00
Minneapolis (f.o.b. Twin Cities)	23.10	18.10
Montreal	28.00	21.50
New Orleans	24.00	21.00
New York (f.o.b. refinery)	16.00	11.50
Philadelphia	16.00	12.00
Pittsburgh	24@26	4@18
St. Louis	22.50	15.00
San Francisco (f.o.b. refinery)	18.00	12.00
Seattle	21.40	18.00

ROAD OILS—Manufacturers' quotations, f.o.b., in tank cars, 8,000 gal. minimum, per gal.:

New York, 40@60% asphalt	$0.04
St. Louis, 40@60% asphalt	.024½@.035
Dallas, 40@60% asphalt	.05

Iron and Steel

PIG IRON—Producers' quotations, per gross ton, f.o.b.:

Birmingham, No. 2 fdry., silicon, 1.75@2.25	$12.00@$13.00
Pittsburgh, basic	17.00@17.50

STRUCTURAL STEEL—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill:

	Shapes, 3 to 15-In.	Plates, ¼-in.
Birmingham	$1.75	$1.75
Chicago	3.00	3.00
Cleveland	2.95	2.90
Dallas	3.90	4.00
New York	2.35	2.35
Pittsburgh	1.65	1.65
St. Louis	3.25	3.25
San Francisco	2.90	2.90

BARS, CONCRETE REINFORCING—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill, on bars rolled from billets, size ½-in.:

Birmingham	$1.75
Chicago	2.15
Cleveland	2.25
Dallas	2.50
New York	2.35
Pittsburgh	1.65
St. Louis	3.15
San Francisco	2.50

EXPANDED METAL LATH—Per 100 sq.yd., painted, delivered to job, in lots under 200 sq.yds:

Lb. per Sq.Yd.	New York	Birmingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$15.50	$16.98	$10.10*	$12.50@$16.00	$18.00	$21.50
2.5	16.50	18.00	10.90*	13.50@ 17.00	19.50	22.50
3.0	18.00	20.00	12.25*	15.00@ 18.50	.....	25.00
3.4	19.00	21.50	13.10*	16.00@ 19.50	24.00	27.00

*More than 200 sq.yds.

WIRE REINFORCEMENT FOR CONCRETE—Plain, per 100 sq.ft., 4 in. x 4 in mesh; manufacturers' quotations are in carloads at mills; dealers' are delivered in lots of 10,000 sq.ft. or over:

Style Number	Weight in Pounds per 100 sq.ft.	Pittsburgh Mill	Chicago District Mill	Del. From Warehouse: New York	St. Louis	Dallas	San Francisco
032	22	$0.94	$0.96	$1.32	$1.30	$1.63	$1.22*
049	28	1.20	1.23	1.67	1.70	2.00	1.55*
068	30	1.47	1.50	2.07	2.10	2.25	1.91*
093	45	1.88	1.93	2.65	2.65	2.86	2.46*
126	57	2.33	2.38	3.28	3.30	3.52	3.03*
153	68	2.78	2.84	3.92	3.95	4.20	.....
180	78	3.19	3.27	4.49	4.35	4.80	.....

* F.o.b.

STEEL SHEETS—Prices per 100 lb. for base sizes, delivered from warehouse, except in Pittsburgh, where prices are f.o.b. mill:

	Blue Annealed No. 10*	Black No. 24	Galvanized No. 24
Chicago	$3.35	$3.80	$4.35
Cleveland	3.00	3.60	4.00
New York	2.65	3.50	4.00
Pittsburgh	1.85@1.90	2.25@2.35	2.80@2.90
St. Louis	3.45	4.05	4.50
San Francisco	3.65	4.15	4.65

*Light plates.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River.

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	5%
"Special Steel" and extra strong cast steel, round strand rope	27½%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Structural rivets, round head, ½-in., full kegs, per 100 lb., delivered from warehouse, except in Pittsburgh, where prices are f.o.b. mill:

Chicago	$4.00
Dallas	5.00
Denver	4.65
New York	4.00
Pittsburgh	2.75
St. Louis	4.15
San Francisco	5.00
Seattle	4.50

STEEL SHEETPILING—Manufacturers' base price, f.o.b., Pittsburgh, for large mill lots, per 100 lb. $1.90

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill:
Per package $10.30

SHIP SPIKES—Per 100 lb., black, from dealers' warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	⅜-In.	½-In.	⅝-In.
San Francisco	$5.50	$5.05	$4.90
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, $3.00 per 100 lb.

WIRE NAILS—Per 100 lb. keg, base, delivered from warehouse stocks; also Pittsburgh mill base:

Pittsburgh Mill	Birmingham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$1.95@$2.00	$2.25	$3.30	$2.35	$3.50	$3.15	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$8.75	$9.00@ $9.50	
Stove plate	4.75@5.50	7.75@ 8.25	$6.00
No. 1 machinery cast	8.00	10.50@ 11.00	7.75*
Machine shop turnings	3.00	4.25@ 4.75	4.75
Cast borings	3.00	4.25@ 4.75	4.00
Railroad malleable	8.50	10.50@ 11.00	10.00
Re-rolling rails	9.25	10.00@ 10.50	9.25
Misc. steel rails	.....	9.50@ 10.00	11.00
Heavy melting steel, No. 1	6.50	9.25@ 9.75	9.25
Iron and steel pipe	7.25	4.50@ 5.00	.....

*Net ton.

FREIGHT RATES—The following freight rates per 100 lb., effective May 20, 1930, apply on finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc.:

Atlanta	$0.58*	Detroit	$0.265†
Baltimore	.27†	Kansas City	.695†
Birmingham	.58*	New Orleans	.67*
Boston	.40†	New York	.33†
Buffalo	.235†	Pacific Coast (all rail)	1.15‡
Chicago	.34†	Philadelphia	.29†
Cincinnati	.265†	St. Louis	.39†
Cleveland	.185†	St. Paul	.60*
Denver	1.15‡		

*36,000 lb. †40,000 lb. ‡60,000 lb.

Railway Materials and Supplies

STEEL RAILS—Manufacturers' quotations per gross ton, f.o.b.:

	Pittsburgh	Birmingham	Chicago
Standard openhearth rails	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	34.00	36.00@36.50	34.00@36.00
Re-rolled rails	24.00@28.00	34.00@35.00	34.00@36.00

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.00	$1.20
	Creosoted—prices on application.		
Birmingham	White oak, untreated	.....	.70@.80
	Southern pine, creosoted	.....	1.25
Chicago	White oak, untreated	1.35	1.70
	Oak, empty cell, creosoted	1.75	2.30
	Oak, zinc treated	1.55	2.05
	Southern pine, creosoted	1.45	1.90
St. Louis	White oak, untreated	.95	1.45
	Red oak, creosoted	1.25	1.80
	Sap pine or cypress, untreated	.75	1.25
San Francisco	Douglas fir, green, untreated	.64	.78
	Douglas fir, empty cell, creosoted	1.41	1.90
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Manufacturers' and dealers' quotations per 100 lb. f.o.b., Pittsburgh mill, for large mill lots, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, $\frac{9}{16}$-in. and larger	$2.80	$2.80	$3.75	$3.65@$4.00	$4.10
Track bolts	3.80	3.80	.....	4.50@ 5.00	5.10
Standard section angle bars, splice bars or fish plates	2.75	2.75	2.75	.....	.....
Tie plates	1.95	.....	1.80@1.90	.....	.....

Pipe

WROUGHT-STEEL PIPE—Discounts from manufacturers' and dealers' standard lists:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago, warehouse, delivered	57.3%	44.8%	53.9%	41.4%
Cleveland, warehouse, delivered	53.3%	42.3%	50.8%	37.8%
New York, warehouse, delivered	56.14%	43.6%	52.72%	40.18%
Pittsburgh, large mill lots, f.o.b.	64%	52.5%	61%	49.5%
St. Louis, warehouse, delivered	51%	38%	48%	35%

CAST-IRON PIPE—Prices per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$38.00@$39.00	$35.00@$36.00
Burlington (N. J.) mill	38.00@ 39.00	35.00@ 36.00
Chicago	46.00@ 47.00	43.00@ 44.00
New York	41.00	38.00
Pittsburgh	46.50@ 47.50	43.50@ 44.50
St. Louis	45.00@ 46.00	42.00@ 43.00
San Francisco	48.00@ 49.00	45.00@ 46.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	$0.105	$0.175	$0.315	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	*.129*	*.215*	*.387*	*$0.816*	*1.56*	*$2.18*	*4.38*
Boston	.18	.28	.55	1.35	2.38	3.95	5.90
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.125	2.025	3.672	5.74
Cleveland	.189	.294	.567	1.35	2.43	4.824	7.38
Dallas	.23	.325	.586	1.106	1.95	3.68	5.00
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	.....
Kansas City	.21	*.31*	.52	1.22	1.90	3.60	.....
Los Angeles	.21	.29	.52	1.186	2.03	3.39	5.09
Minneapolis	.155	.24	.50	1.15	1.85	3.45	4.60
Montreal	*.30*	*.45*	*.75*	*1.45*	*2.60*	.....	7.20
New Orleans	.18	.30	.54	1.02	1.95	.....	.....
New York	.17	.265	.52	1.30	2.34	4.47	6.86
Philadelphia	.0945	.147	.297	.80	1.44	2.304	3.28
Pittsburgh	.1575	.245	.54	1.25	2.25	4.68	7.17
St. Louis	*.1295*	*.215*	*.423*	*1.05*	*1.80*	*3.20*	*4.40*
San Francisco	.21	.30	.54	1.26	2.16	3.60	5.40
Seattle	.22	.30	.54	1.26	2.16	3.50	5.50

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.-ft.:

Size, In.	New York	Birm'ham	Pittsburgh	St. Louis	Dallas	San Fran.	Seattle
4	$45.00*	$56.00	$80.00	$50.00	*$80.00*	$67.50	$60.00
6	80.00*	112.00	110.00	85.00	.....	112.50	112.00

*F.o.b.

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York.... *$0.097* Chicago.... *$0.102* Minneapolis... *$0.103*

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.25; White, in oil, $13.25; Red, dry, $13.25; Red, in oil, $14.75.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	$1.25@$1.40
Sulphate of copper, in bbl., per 100 lb	4.25@ 4.50
Soda ash, 58%, in bags, per 100 lb	1.15@1.17½
Chlorine, cylinders, per lb	.04@ .06
Bleaching powder, in drums, f.o.b. works, per 100 lb	2.00@ 2.10
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: ⅝-in., 7-ft.; 6-in.; ¾-in., 6-ft.; 1-in.; ¼-in., 4-ft., 5-in.; 1-in., 3-ft., 8-in.; 1¼-in., 2-ft., 5-in.; 1½-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ¾-in. and larger:

Atlanta	$0.19	Kansas City	$0.25
Baltimore	.225	Los Angeles	*.22*
Birmingham	*.25*	Minneapolis	.19
Boston	.20	Montreal	.185
Chicago	.17	New Orleans	*.22*
Cincinnati	.21	New York	.19
Cleveland	.21	Philadelphia	.21
Dallas	.26	St. Louis	.175@.18
Denver	.20	San Francisco	.175
Detroit	*.215*	Seattle	*.175*

BUILDING PAPER—Black, 50-lb. per roll of 500 sq.ft., in carloads, f.o.b., producing point $2.16

SLATERS FELT—In carloads, per roll, f.o.b., producing point $0.79

ROOFING MATERIALS—Prices, f.o.b. New York, delivered by dealers to contractors, in carloads:

Asphalt felt, per 100 lb	$3.00
Tar felt, per 100 lb	3.00
Asphalt coating, per gal	.34¼
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices, delivered by dealers to contractors, in carloads, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6.12
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	6.00
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2.50

WINDOW GLASS—Discounts from list at New York warehouse:

	Single Thickness		Double Thickness	
	A Quality	B Quality	A Quality	B Quality
First 3 brackets	89%	91%	88%	90%
Larger sizes	88%	90%	88%	90%

EXPLOSIVES—Manufacturers' quotations per pound for dynamite delivered in small lots—under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles, f.o.b.†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.20	.225
Birmingham	.225	.24	Montreal	.20	.24
Boston	.225	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.25‡	.2725‡
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	.2125	.2475	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered to contractor at site of job, in Manhattan, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$50.00	$32.00
3x10 to 10x10	60.00	35.00
3x12 to 12x12	65.00	35.00
3x14 to 14x14	75.00	37.50

Chicago—Prices, f.o.b., in carloads, No. 1 Common, rough, per M. ft. b.m. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft. Douglas Fir
3x4 to 8x8	$39.50	$37.50
3x10 to 10x10	47.00	37.50
3x12 to 12x12	58.00	37.50
3x14 to 14x14	71.00	38.50

San Francisco—Douglas fir, No. 1 Common, rough, at yards. For delivery to contractor at site of job, add $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$30.00	$32.00
3x6 and 8	30.00	32.00
3x10 and 12	30.00	32.00
3x14	33.00	34.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine	Fir	Hemlock	Spruce	Pine	Fir
Atlanta	$50.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	$61.75	75.00	$50.25
Birmingham	30@35	.....	.....	.....	63.00	.....
Boston	51.00	45.00	47.00	48.50	57.00	42.00
Cincinnati	42.50	55.00	.....	.....	52.50	52.50
Cleveland	54.00	*54.00*	.....	.....	*45.00*	*49.00*
Dallas	55.00	57.50	55.00	55.00	55.00	50.00
Denver	.....	50.00	50.00	50.00	.....	47.00@55.00
Detroit	*51.00*	*48.50*	.....	.....	67.00	*48.50*
Kansas City	36.00	*37.50*	*37.50*	.....	*56.00*	40.00
Los Angeles	.....	43.50	.....	.....	.....	45.50
Minneapolis	.....	46.25	.....	.....	.....	46.25@47.75
Montreal	.....	.....	.....	40.00	*40.00*	.....
New Orleans	*40.00*	40.00	.....	45.00	65.00	60.00
Philadelphia	48.00	42.00	41.00	46.00	58.00	42.00
Pittsburgh	53.00	57.00	65.00	66.00	*46@57*	*57@60*
St. Louis	50.00	*39.00*	*39.00*	.....	*58.00*	41.00
Seattle	.....	18.00	.....	.....	.....	*17.00*

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine	Fir	Hemlock	Pine	Fir
Atlanta	$55.00	.....	.....	$40.00	.....
Baltimore	55.00	*$44.50*	$44.00	.....	.....
Birmingham	**44.00**	.....	.....	*40.00*	.....
Boston	46.00	40.00	42.00	**48.00**	$44.00
Cincinnati	45.00	47.50	.....	35.00	45.00
Cleveland	65.00	*54.00*	.....	42.00	54.00
Dallas	60.00	.....	.....	55.00	.....
Denver	40.50	38.00	38.50	.....	44.00
Detroit	47.00	44.00	.....	45.50	44.50
Kansas City	**47.00**	*36.00*	*36.00*	**33.50**	30.00
Los Angeles	40.50	40.50	.....	.....	48.50
Minneapolis	65.00*	40.00	.....	45.00*	39.00
Montreal	*45.00*	50.00	40.00	.....	55.00
New Orleans	40.00	40.00	.....	54.00	48.00
Philadelphia	50.00	42.00	40.00	53.00	42.00
Pittsburgh	*50.00*	*47.00*	55.00	40.00	50.00
St. Louis	*50.00*	*50.00*	*40.00*	*44.00*	*44.00*
Seattle	.....	**17.50**	.....	.....	**16.00**

*Northern Pine, No. 2 Com.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.12	$0.165
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.165	.215
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.19	.235
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.225	.345
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2425	.295
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.305	.395
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.345	.435

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterworks			
Lincoln (Neb.)	Water supply	$2,400,000	Proposed
Bridges			
Indiana and Kentucky	Bridge piers	5,000,000 (total)	Contract
St. Charles (Mo.)	Bridge superstructure	3,250,000	Proposed
Power and Lighting			
New York	Power equipment	2,158,000	Contract
Federal Government			
Kansas City (Mo.)	Post office	4,500,000	Bids asked
St. Louis	Post office addition	1,600,000	Proposed
Cle Elum (Wash.)	Dam	3,500,000	Bids asked
Paris (France)	Embassy	1,600,000	Bids asked
Power Plants			
Sioux City (Ia.)	Power plant	1,300,000	Proposed
Utah	Power plant	4,000,000	Proposed
Buildings			
New York	Apartment	4,000,000	Separate Contract
Long Branch (N.J.)	Hospital	1,000,000	Proposed
Norfolk (Mass.)	Prison colony	1,500,000	Proposed
Worcester	Auditorium	2,000,000	Proposed
Jersey City	Hall of Records	12,000,000	Proposed
New York	Art museum	3,350,000	Proposed
Madison (N.J.)	College	5,000,000	Proposed
Brooklyn	High school	3,000,000	Proposed
Kansas City (Mo.)	Builders Mart	6,000,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., Whittier—City Council, D. Allen, clk., will ask new bids 150,000 gal. steel water tank for Rideout Heights. Former bids rejected.

Conn., Waterbury—City, P. Wks. Dpt., erecting, installing pumping station. $50,000 bond issue authorized for same. R. Cairns, City Hall, engr.

Ia., Altoona—See "Contracts Awarded."

Mass., Belchertown—Commonwealth of Massachusetts, Boston, wells, standpipe at State School. $15,000. Engineer not selected.

Mass., Gardner—Water Dpt., W. J. Wetherbee, supt., 3,100 ft. 10 in. main in East Broadway, and 1,500 ft. in Minott St. $15,000.

Mass., Woburn—Extending waterworks, incl. new wells, pumps. $110,000. Metcalf & Eddy, Statler Bldg., Boston, engrs. Noted Apr. 2.

Mich., Jackson—City, W. B. Hodges, mgr., soon takes bids furnishing, installing 7 deep well pumps in wells at city water pumping station, drilling two 18 in. additional wells at old waterworks station. Water St., also incl. all electrical work for pumps. $81,000.

Missouri—St. Louis County Water Co., W. H. Henby, pres., 6600 Delmar St., University City, filtration plant, on Missouri River. $600,000. United Engineers & Constructors, 112 North Broad St., Phila., Pa., engrs.

Neb., Lincoln—Water supply from wells on Platte River near Ashland. $2,400,000 bonds voted for same. D. L. Erickson, city engr. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., consult. engrs.

N. J., Mountainview — Township Com., Municipal Bldg., waterworks. $15,000 or more.

N. Y., Jamaica—Jamaica Water Supply Co., 161-20 89th Ave., steel tank, tower, 92nd Ave. and 127th St. $65,000.

Pa., Morrisville—City Council 275,000 gal. water standpipe for Morris Heights Sec. T. B. Stockham, mayor.

O., New Philadelphia—City, Bd. Control, bids about May 19, sinking new wells, improving waterworks plant. $25,000.

O., Wadsworth—City, Bd. Control, purchasing site, installing new wells, also added facilities to waterworks plant. $25,000.

S. D., Huron—See "Dams."

Tex., Gladewater—Complete waterworks, incl. distributing system, 16,000 lin.ft. mains, pumping unit, probably tank and tower. $35,000.

BIDS ASKED

Calif., Fontana—P. S. Hasbrouck, mgr. Fontana Mutual Water Co. taking bids deep well turbine, 1,400 g.p.m., 665 ft. lift.

Ind., Paoli—City Council bids about June 15, water filtration plant. $15,000. C. Brossman, Chamber of Commerce Bldg., Indianapolis, engr.

Ky., Louisville—May 14, by Louisville Water Co., Inc., 435 South 3rd St., 500,000 gal. elevated tank, on Herrs Lane, in suburban district east of here. $35,000. J. Chambers, 435 South 3rd St., engr.

Mich., Detroit—May 26, by Bd. Water Comrs., 735 Randolph St., 6 control valves for emergency intake. G. H. Fenkell, gen. mgr. and ch. engr.; adv. E.N.-R. May 7.

Mich., St. Joseph—May 11, by City, 4 m.g. filtration plant, pumping station, incl suction well, pump room, filter plant, sedimentation basins, clear water reservoir, necessary piping, other appurtenances. Gordon & Blout, 53 West Jackson Blvd., Chicago, Ill., consult. engrs. Noted Apr. 16.

Minn., Minneapolis—See "Contracts Awarded."

New York—May 12, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, steel, c.i. mains in East 204th St., Jerome and Webster Ave., Bronx Boro and Bronx River Rd., Yonkers.

N. Y., St. George—May 12, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Larsen Court, Merser, Prospect and Simonson Pls., Bond, Faber, Florence, and Summit Sts., Barnes, Brighton, Davis, DeHart, Delafield, Granite, Grove, Harrison, Hendricks, Nelson, Richmond, Wheeler, and Westervelt Aves., Richmond Boro.

N. D., Grand Forks—May 27, by City, 2 story, 150 x 300 ft., brick, steel, filtration plant addition. $80,000. E. L. Lium, city engr.

Pa., Lancaster—May 20, by at office T. W. Metzger, mayor, City Hall, c.i. force mains, reinforcing mains, 5 m.g. stand pipe, and found. J. N. Chester Engineers, 813 Clark Bldg., Pittsburgh, engrs. Noted Apr. 9.

Tex., Thorndale—May 12, by City, c/o J. Rady, engr., 425 Provident Bldg., Waco, complete waterworks, incl. 2- to 8-in. pipe valves, hydrants, and 50,000 gal. elevated tank, pumps, motors, etc. Noted Oct. 2.

Tex., Vega—May 12, by City, c/o C. C. Wimberly, mayor, V. Shields, secy., waterworks, incl. 13,610 ft. 2- to 6-in. c.i. pipe; five 6 in. and eight 4 in. fire hydrants; two 6 in., seven 4 in., eight 2 in. d.c. valves and boxes; 4,500 lb. c.i. fittings, 50,000 gal. steel tank and tower; 50 corporation cocks and goose necks; 50 curb cocks; 50 meter ¾ x ¾ in.; 2,000 ft. ¾ in. pipe; 50 concrete meter boxes with c.i. rings, and locking covers. $25,000. Former bids rejected. Devlin Eng. Co., 713 Fisk Medical & Professional Bldg., Amarillo, engrs. Noted Apr. 22 Daily.

W. Va., Parkersburg—May 12, by City Council, waterworks extensions, incl. 37,400 ft. 6 in., 20,900 ft. 8 in., 3,750 ft. 10 in. and 10,650 ft. 12 in. Class B and C c.i. bell and spigot pipe, $80,000. Pipe, etc., to be furnished by city and contractor will be required to pay in full for all material furnished by city. L. G. Merrill, city engr. Morris Knowles, Inc., Westinghouse Bldg., Pittsburgh, Pa., engrs. Noted Feb. 5.

Wis., Racine—City bids about May 15, water pumping station. $500,000. Alvord, Burdick & Howson, 20 North Wacker Dr., Chicago, Ill., engrs.

CONTRACTS AWARDED

Calif., Burbank — City Council, to Western Pipe & Steel Co., 5717 Sante Fe Ave., Los Angeles, furnishing, delivering 1,210 ft. 18 in. electrically welded steel pipe at trenchside at $1.80 per ft., $0.27 per additional ft. for double dipped with Petrolastic and Pabco covering.

D. C., Wash.—District Comrs., 223 tons pipe fittings (French), to Herbert Kennedy Co., Inc., 122 East 42nd St., New York, $15,364.

D. C., Wash.—District Comrs., 3,755 lin.ft. 36 in., 2,450 ft. 48 in. and 282 ft. 36 in. concrete or D main to J. B. McCrary Co., Citizens & Savings Bank Bldg., Atlanta, Ga., $115,000. Noted Mar. 19.

Ia., Algona — Enlarging filtration plant by 396,000 gal., to H. R. Cowan & Son, Algona. Est. $30,000. Noted Oct. 1.

Ia., Altoona—City Council, well, to F. S. McCutchen, 4214 4th St., Des Moines. New bids later on 7,090 ft. 2 in., 8,950 ft. 4 in. and 930 ft. 6 in. c.i. mains, 20 fire hydrants, 18 valves, boxes, 40,000 gal. tank on tower, pump house, pump. Total $25,000. E. T. Archer & Co., 809 New England Bldg., Kansas City, Mo., engrs.

Ia., Audubon—City Council digging 4 shallow wells, installing four 125 g.p.m. pumping units, constructing 225,000 gal. storage reservoir, two 50 hp. motors. $40,000. Henningson Eng. Co., 326 Union State Bank Bldg., Omaha, Neb., engrs.

Ia., Burlington—Citizens Water Co., B-steel standpipe, to Pittsburgh-Des Moines Steel Co., Tuttle and Southwest 10th Sts., Des Moines, $17,441; grading, concrete found. for standpipe, booster pumping station, to C. M. Hohlen, Burlington, $3,741. Noted Feb. 19.

Ia., Wellsburg—G. Gerrdes, city clk., 12,000 ft. 2- to 6-in. mains, 150 lb. McWain pipe, Iowa valves, hydrants, to C. W. Roland Co., 1347 8th St., Des Moines, $9,700. Est. $15,000. Noted Feb. 5.

Mass., Pembroke—Bd. Water Comrs., at office Fay, Spofford & Thorndike, engrs., 44 School St., Boston, laying 76,700 ft. bell and spigot pipe, 350 ft. joint pipe, 162 gate valves, 80 fire hydrants, constructing 310 service connections, elevated tank structure, to Federico & Susi Co., 43 Westwood St., Dorchester, $65,094. Noted Apr. 2.

Minn., Minneapolis—City, reservoir to replace water tower in Washburn Park, day labor, $75,000. N. W. Elsberg, city engr.

Mich., Plymouth—Detroit House of Correction, 1441 Alfred St., Detroit, furnishing, erecting 300,000 gal. elevated steel water tank at Northville Prison Farm, to Pittsburgh-Des Moines Steel Co., 2842 West Grand Blvd., Detroit, $14,445. Noted Apr. 2.

Minn., St. Paul—C. A. Carlson, city purch. agt., 12 in. and 36 in. valves, to Michigan Valve & Fdry. Co., Amer. Trust Bldg., Detroit, Mich., $1,360; 4- to 16-in., to Crane Co. of Minnesota, 5th and Bway., St. Paul, $2,242; 24 in., to South Park Fdry. & Machine Co., 818 North Concord St., South St. Paul, $1,168. Grand total $4,770. Noted Mar. 12 Daily.

N. Y., New York—Bd. Water Supply, test borings in Colchester and Hancock, Delaware Co., Contr. 309, to Battle Bros., 818 Beech St., Scranton, Pa., $17,614. Noted Apr. 2.

N. Y., New York—Bd. Water Supply, 436 Bway., borings in town of Gardiner, Contr. 310, Kennedy Reigger Drilling Co., Inc., 30 Church St., $18,740; in Wappingers Contr. 311, to Sprague & Henwood, Scranton, Pa., $28,360. Noted Apr. 16.

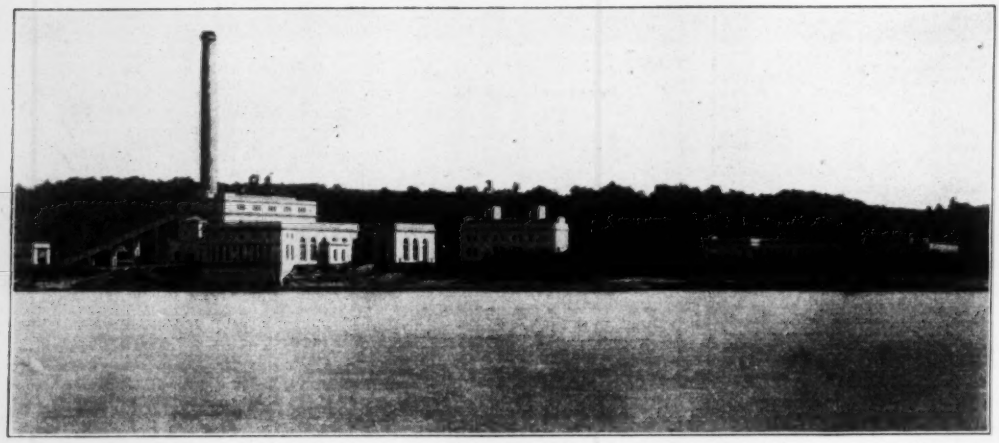
N. D., Grand Forks—200,000 gal. elevated tank, to Pittsburgh-Des Moines Steel Co., Tuttle-

See proposal advertising on page 147

Constr. News page 193

LEADITE

Trade Mark Registered U.S. Pat. Office



City of St. Louis Water Works—Howard Bend Plant

120.74 Miles of cast iron bell and spigot Water Mains laid in St. Louis - - - *with Leadite Joints*

Since St. Louis began to use LEADITE in 1924, they have laid 120.74 Miles of cast iron bell and spigot water mains jointed with LEADITE . . . Pipe sizes varying from 3 in. to 36 in. diameter, and their pressures varying from 25 lbs. to 125 lbs. per square inch.

Practically all of the bell and spigot water mains laid in St. Louis since 1924 (at which time LEADITE was first adopted by them) have been jointed with LEADITE.

Mr. Leonard A. Day is Water Commissioner of the City of St. Louis.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.

No Caulking

Waterworks (Continued)

and Southwest 10th Sts., Pittsburgh, Pa., $38,560; water clarifying machinery, to Dorr Co., 333 North Michigan Ave., Chicago, Ill. Noted Oct. 30.

Neb., Hastings—Extending 8 and 10 in. c.i. mains in Hastings and Elm Aves., to H. H. Framkamp, Mankato, Minn., $20,780.

N. J., Beverly—Burlington Twp., laying 8,545 lin.ft. 6 and 8 in. c.i. mains to W. G. Fritz Co., West Orange, $3,186; furnishing 8,545 lin.ft. 6 and 8 in. c.i. pipe, incl. castings for water supply, to Pipe & Fdry. Co., Burlington, $5,778.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., pumping plant, discharge main at Croton Lake, to Erickson Equipment Co., Grand Central Terminal, $288,400. Noted Apr. 16.

O., Conneaut — City, waterworks improvements, incl. 20 in. c.i. intake pipe line, submerged inlet crib, to Thacher Bros. Contg. Co., 1206 Cherry St., Toledo; rein.-con. clear well, to Downing & Hetrick, Inc., 12 North 3rd St., Columbus. Est. $85,000.

Okla., Chickasha—City Council, c.i. pipe, fittings, to Natl. Cast Iron Pipe Co., Land Bank Bldg., Kansas City, Mo., $47,910 and $929 respectively; 2,600 ft. 16 in. c.i. pipe, to Gilkey Hardware Co., Chickasha, $5,772; 6,000 lb. big lead, to Crane Co., 701 West Main St., Oklahoma City, $3,024; 2,000 lb. tarred oakum, to United States Supply Co., 706 West Noble St., Oklahoma City, $143; unloading and hauling materials, to W. E. Edminston Constr. Co., 205 Hall-Brisco Bldg., $888. Grand total $58,666. Noted Feb. 19.

Tex., Amarillo—Increasing water supply, drilling new wells, pumping units, some distributing main pipe, to D. L. McDonald, Amarillo Bldg., $110,000.

Tex., Barstow—City, c/o R. T. Stribling, mayor, waterworks, incl. water supply, supply line, distribution system, elevated storage tank, to J. B. McCrary Co., Praetorian Bldg., Dallas.

Tex., Corsicana—City, c/o J. P. Welch, city secy., extending water purification plant, to Klein Bros. Co., 422 North Walton St., Dallas, $18,746. Est. $19,000. Noted Feb. 5.

Tex., Tenaha—City, waterworks and sewerage systems, to Utility Engr. & Constr. Co. Ltd., Republic Bank Bldg., Dallas, $60,000. Noted Feb. 5.

SEWERS

PROPOSED WORK

Ark., Dumas — City Council postponed indefinitely taking bids 33,290 ft. 6 in., 5,073 ft. 8 in., 3,000 ft. 15 in. sewers, 4,020 ft. 15 in. and 1,130 ft. 18 in. storm water drains, 2 lift stations, sewage disposal plant, Imhoff tank, accessories in Sewer Impvt. Dist. 1. $45,000. F. R. Allen, Pine Bluff, engr. Noted Feb. 5.

Conn., Greenwich—Outfall sewer from Sound Beach disposal plant out into deep water. To exceed $25,000. S. E. Minor, town engr.

Conn., New Haven—Storm and sanitary sewers, $200,000. E. Nettleton, City Hall, engr.

Kan., Dodge City—Sewage disposal plant. To exceed $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mo., St. Louis—Soon takes bids 1,885 lin.ft. 10- to 21-in. vitr. clay sewers, laterals, manholes, inlets in Sharp Avenue Sewer Dist. 1. W. W. Horner, city engr.

N. J., Clifton—Bd. City Council, sanitary sewerage system, Richfield Sect. $25,000. J. Fitzgerald, city engr.

N. J., Paterson—Bd. City Comrs., City Hall, sanitary sewers in East 23rd and Spruce Sts. $25,000. H. J. Harder, city engr.

N. J., Woodbury—Boro, A. T. Underwood, chn., sewage disposal plant, Woodbury River and Crossan Point Rd. $25,000. O. J. Carter, Woodbury, and W. H. Boardman, 426 Walnut St., Phila., Pa., engrs.

N. Y., Utica—Bd. Contrs. & Supply, extending railroad intercepting sanitary sewer Part 2. J. B. Shaw, city engr.

Pa., Meadville—Bids probably in July, filter type sewage disposal plant. $150,000. R. Phillips, City Hall, engr.

R. I., Providence—Sewerage work in Hartford Ave., Thackery, Stella, Ida and Berkshire Sts. $25,000-$30,000.

R. I., Providence—Sewerage works in Melissa, Moorefield and Harvest Sts., Fairokes and Leo Aves. $25,000.

R. I., Providence — City, Sewerage Dpt., sewerage works in Summit Ave., Clym, Donelson, June and Pumganasett Sts. $27,500.

Tex., Austin—City, c/o A. R. Johnson, mgr., postponed indefinitely, on account of injunction, construction 37,550 ft. 6 and 8 in. vitr. clay sanitary sewers, 90 manholes, Sanitary Sewer Bond Fund, Contr. 12, various districts. $100,000. C. G. Levander, Austin, sewer engr.

Tex., Gladewater—Complete sanitary sewerage system, incl. 22,000 ft. sewer mains, disposal unit. $35,000.

Ont., Toronto—For ¾ mi. brick, concrete or concrete sewer in Palmerston Ave., partly tunnel. $53,955. R. C. Harris, City Hall, engr.

BIDS ASKED

Ark., Blytheville—May 20, by Comrs. of Sewer Impvt. Dist. 3, City Hall, 30,248 lin.ft. 8- to 15-in. sewers laid complete, 48 lin.ft. 10 in. and 80 lin.ft. 12 in. c.i. pipe, 67 manholes, 24 flush tanks, 7 drop manhole construction, 702 wyes, 54 tees, 3,000 lin.ft. special bottom construction, Pumping Plants 1 and 2, Imhoff tank, sludge bed, 7,000 lin.ft. 6 in. house connections, 120 sq.yd. paving. E. J. Keaton, engr. Noted Apr. 16.

Calif., Culver City—May 25, by City Council, vitr. sewers in Zanja Ave., $75,000. G. E. Lee, city engr.

Ind., Anderson — May 15, by Bd. P. Wks., new sewerage system in Southwest Dist., incl. 8- to 30-in. pipe. $27,000. H. Gwinnup, Anderson, engr.

Ind., Butlerville — City Council bids about June 15, sewage disposal plant. $25,000. C. Brossman, Chamber of Commerce Bldg., Indianapolis, engr.

Ind., Franklin — City Council bids about June 15, sewage disposal plant. $35,000. C. Brossman, Chamber of Commerce Bldg., Indianapolis, engr. Noted Apr. 2.

N. Y., New York—May 15, by Sanitary Comm., W. Schroeder, Jr., chn., Municipal Bldg., dock, seawall, dredging channel, and constructing dock and seawall along east shore Wards Island, in connection with sewage treatment works, Sect. 1, Contr. A.

O., North Canton (br. Canton)—Town, Bd. Control, bids about June 29, storm water sewers in Woodland Rd., Church St., Cole Ave. $25,000. R. M. Wright, North Canton, engr.

Pa., Phila.—May 13, by Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., Schedule A, branch sewers in Mildred St. from Reed St. to point 110 ft. south, Pacific St. from Balfour St. to summit northwest, in Balfour St. from Victoria to Pacific Sts.; Schedule B, branch sewers in 11th St. from Locust to Spruce Sts., Emerald St. from York to Cumberland Sts., Front St. from Moore to Mifflin Sts., Hunting Park Ave. from K to M Sts., Knorr St. from Charles to Hawthorne Sts., Marshall St. from Willow to Spring Garden Sts., Memphis St. from Ontario to Venango Sts., Shelbourne St. from Annsbury to Wyoming Sts.

S. D., Huron—May 26 (extended date), by City, sewage disposal plant. $190,000. O. A. Ricker, city engr. Consoer, Older & Quinlan, 205 West Wacker Dr., Chicago, Ill., consult. engrs. Noted Apr. 24.

Ont., Hamilton—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Carpinteria—Bd. Trustees Carpinteria Sanitary Dist., 6 mi. 6- to 12-in. vitr. sewers, 2.5 mi. house connections, manholes to Markovich & Nikcevich, 1205 Stanley Ave., Long Beach, $57,448. Noted Apr. 2.

Calif., Gonzales—Bd. Trustees Gonzales Sanitary Dist., sewer mains, outfall and sludge digestion plants, to G. De Goyler Federal Telegraph Bldg., Oakland, $27,736; lateral sewers, to Oakland Sewer Constr. Co., Lakeside Hotel, Oakland, $15,688. Noted Apr. 9.

Calif., Los Angeles—Bd. P. Wks., City Hall, Sect. 2 San Pedro Intercepting Sewer, incl. 6,333 ft. 33 in. precast rein.-con. pipe with vitr. clay lining with tunnels, appurtenances to H. E. Warden, 2401 South Orange Dr., $89,900. Noted Apr. 16.

Md., Baltimore—Bd. Awards, storm drains in Storm Water Contr. 163, to F. Angelozzi, Kennison St. and Rogers Ave., $27,954. Noted Apr. 23 Daily.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sewerage works in Northern Ave., to DeCristoforo Bros. Co., 38 Glendower Rd., Roslindale, $19,300—Bearse Ave., to M. DeSisto, 198 Lagrange St., Roxbury, $7,793—Hayes Rd., to Roslindale Constr. Co., 34 Averton St., Roslindale, $6,053—Butler St., to J. Williams, 8 Beechwood St., Dorchester, $10,958. Grand total $44,104.

Mo., Kansas City—Sanitary sewers in Dists. 1, 2, 3, 4, 9 and 10, to Boyle Constr. Co., 226 West 39th St., $53,296.

Mo., Sullivan—For 3,920 lin.ft. 15 in. vitr. clay pipe, 48 ft. 16 in. c.i. pipe 11 manholes, 5,885 ft. 4 in. c.i. mains, 700 ft. 3 in. wrought iron pipe, 3 fire hydrants, 3,100 ft. 2,300 volt single phase power line to disposal plant, primary settling tank, dosing and secondary treatment, plant, 110 ft. revolving sewage distributor, tanks, pumps, to G. L. Dunbar, 7514 Buckingham Dr., St. Louis, $29,850. Noted Mar. 19.

N. J., Fairhaven — Monmouth Co., Court House, Freehold, storm sewer in Hance Rd., to Red Bank Sanitary Sewer Co., Red Bank. Est. $25,000. Noted Apr. 3 Daily.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, sewer in Ontario Ave., to J. J. O'Rourke, 239 Gordon St., Stapleton. $26,911. Noted Apr. 9.

O., Akron—F. E. Swineford, dir. P. Serv., 3,525 ft. 33 in. brick, trunk sewer, manholes, Springfield Lake Outlet, to S. Erslan, 83 Shaker Dr., $32,918. Est. $50,000.

Ore., Portland—City Comrs., 1,400 ft. cement sewers in 92nd St., to G. L. Potts, Portland, $22,098. Est. $26,224.

Pa., Phila — Bd. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., Schedule A, main sewer in Lardner St. from Delaware River to northwest of Tacony St., to M. J. Driscoll, 100 Apsley St., $147,565; Schedule B, grading Welsh Road Bridge over Pennypack Creek, to Union Paving Co., Broad and Stiles Sts., $71,342. Noted Apr. 16.

Tex., Houston—City, c/o W. E. Monteith, mayor, 5,930 ft. 18 to 120-in. c.i. class A, monolithic and rein.-con. storm sewers, Sect. 1, North Main St. extending along White Oak Gulley from Vincent and Fugate Sts. to Winston and North Main St., incl., to McCrary Constr. Co., Praetorian Bldg., Dallas, $147,716. Noted Apr. 2.

Tex., Tenaha—See "Waterworks."

Va., Richmond — Dpt. P. Wks., City Hall, Sheppard Street Relief Sewer, to W. J. McLane, Richmond, $68,084; furnishing, delivering precast, reinforced pipe and slab liners, to Concrete Pipe & Products Co., Inc., Central Natl. Bank Bldg., $11,102. City's part of work will make total $150,000. Noted Apr. 9.

Wis., Milwaukee — Metropolitan Sewerage Comm., 5,533 ft. sewers in 51st and Congress Sts., to K. Krogan & Sons, 264 Prospect Ave., $35,335. Noted Apr. 20.

Wis., Milwaukee—Bd. P. Wks., to Teget Constr. Co., 3525 Villard Ave., sewer and water connections in West Fairmount Ave., $3,509; to Wisconsin Sewer & Constr. Co., 2246 South 35th St., 22nd St., $3,441, West Muskegon Ave., $1,741, North 64th St., $841; to F. Goll, Jr., 4934 West State St., North 24th St., $4,380; to T. G. Holton, 811 South 32nd St., North 23rd St., $3,565. Grand total $17,477.

Wis., Milwaukee—Sewerage Comm., pumps, motors, controls for pumping water to obnoxious vapor condensers, to Dayton-Dowd Co., c/o F. H. Dorner, 311 Knopp St., $10,425— setting 15,300 diffuser plates in aeration tanks, to J. R. Zimmermann, 5410 State St., $3,544; gas scrubbing cooling chmabers, to A. C. Guetzkow, Inc., 5410 State St., $15,331; 3 cyclones for dryer house, to Milwaukee Reliance Boiler Wks., 1102 32nd St., $4,770. Grand total $34,070.

Wis., Milwaukee—City, D. McKeith, comr., sewers at intersection North 56th and Melvin Sts., to Werner Co., 721 8th Ave., Wauwatosa, $1,347; North 27th St., to C. E. Stormowski, 950 Warren Ave., $1,180; North 75th and South 1st Sts., to Zimmerman & Zimmerman, 2826 State St., $10,163 and $27,957 respectively; West Roosevelt Dr., to F. A. Gold, 1881 13th St., $242; North 42nd St., to Milwaukee Sewer & Drain Co., 928 Humboldt Ave., $335. Grand total $41,164.

Wis., Platteville—Sewage disposal plant, to R. F. Conlon, Dubuque, Ia., $21,709.

Ont., Hamilton—Sewers in Royal and Holmes Aves. and Sussex and Ward Sts., day labor under supervision of W. L. McFaul, city engr. $117,000. Noted Apr. 9.

WASTE DISPOSAL

PROPOSED WORK

N. J., Englewood—Bd. City Council, Municipal Bldg., will not build incinerator, Linden Ave. $25,000. Project abandoned. G. R. Hartley, city engr. Noted Mar. 12.

CONTRACTS AWARDED

N. J., Beach Haven—Bd. Boro Council, Boro Hall, municipal incinerator, to Pittsburgh Des Moines Co., 50 Church St., New York, $26,646.

Pa., Erie — City Council, equipment for garbage and refuse incinerator plant, incl. furnaces, combustion chamber, flues, chimney, miscellaneous equipment, to Nye Odorless Incinerator Co., 50 East 42nd St., New York, $59,875. Noted Mar. 26.

BRIDGES

PROPOSED WORK

Calif., Petaluma—City Council bridge over Petaluma River, at D St. $75,000.

Mass., Chicopee — City, F. P. Cobb, engr., rein.-con. bridge over Chicopee River, $175,000. B. A. Annable, 145 State St., Springfield, engr.

Mo., Branson—State Hy. Bd., Jefferson City, soon takes bids 1,100 ft. rein.-con., steel bridge over White River, on State Hy. 65. C. S. Cutler, Jefferson City, ch. engr.

Mo., St. Charles—Wabash Ry. Co., W. R. Bennett, ch. engr., Ry. Exch. Bldg., St. Louis, soon takes bids superstructure double-track railroad bridge, incl. one 600 ft. channel span, three 420 ft. spans, one 2,100 ft. and one 4,300 ft. trestle approach spans. $3,250,000. Noted Aug. 14, under "Contracts Awarded."

Mo., St. Louis—City, c/o Bd. B. Serv., City Hall, bids early in summer, rein.-con. bridge to carry Riverview Dr. over Maline Creek. $110,000. L. R. Bowen, city engr. Noted Feb. 19.

N. J., Bound Brook—Bd. Freeholders Sussex Co., Court House, Somerville, bridge over Green Brook. $60,000. Middlesex Co. to contribute toward cost. O. Smith, Somerville, co. engr.

N. J., Clinton—Bd. Freeholders Hunterdon Co., Flemington, bridge over Raritan River, at Halsey St. $45,000. W. F. Roberts, co. engr.

N. J., Mountainview—Joint Bd. Freeholders Passaic Co. (Paterson) and Morris Co. (Morristown) Court House, Paterson, steel, concrete bridge over Pequannock River. $25,000. G. Ferguson, Court House, Paterson, Passaic Co. engr.

O., Cleveland—Repairing bridge, incl. new steel work, plank flooring, concrete substructure over Walworth Run at West 25th St. To exceeds $25,000. R. Hoffmann, City Hall, engr.

Oklahoma — State Hy. Dpt., Oklahoma City, preliminary plans 7 span 120 ft. rein.-con. bridge at Isabella, Major Co. $30,000—1 span 140 ft. steel truss bridge on piers at Roff, Pontotoc Co. $30,000—7 span 112 ft. rein.-con. bridge at Gage, Ellis Co. $25,000. A. R. Losh, hy. engr.

Okla., Verdigris—State Hy. Dpt., Oklahoma City, preliminary plans 2 span 260 ft. steel truss bridge on piers over Verdigris River. $140,000. A. R. Losh, hy. engr.

Wash., Ferndale—Whatcom Co., Bellingham, soon takes bids improving Ferndale River Bridge. $25,000. C. McCoy, Bellingham, co. engr.

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Bridges (Continued)

Ont., St. Thomas—Pere Marquette Ry., H. A. Cassil, ch. engr., Detroit, Mich., high level bridge over Kettle Creek. $400,000.

Ont., Toronto—Replacing present bridge with 250 ft. steel, concrete bridge, concrete abutments, piers, 66 ft. wide, over the Don, on Keating St. $127,185. R. C. Harris, City Hall, engr.

BIDS ASKED

California—May 15, by C. H. Purcell, engr. State Hy. Comn., Sacramento, removing concrete deck, seven 164½ ft. through steel truss spans, bridge over Santa Ynez River, near Buellton, Santa Barbara Co., constructing laminated timber floor, and bituminous macadam surfacing; replacing three 63 ft. span steel truss span bridge with concrete girder approach spans, widening, rein.-con. girder approach spans, consisting two 31 ft., eight 30 ft. and two 21 ft. spans over Santa Ana River, 2 mi. north of Newport Beach, Orange Co.

California—May 20, by C. H. Purcell, engr. State Hy. Comn., Sacramento, 4 rein.-con. bridges, also widening 2 bridges, varying in length from 30 to 105 ft., on Goshen-Kingsburg Rd., Tulare Co.

Illinois—May 12, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, three 54 ft. span rein.-con. arch bridge, Route 5, Sect. 2Y-B Dist. 1, Cook Co.—three 45 ft. span rein.-con. girder, one 30 ft. and three 30 ft. span rein.-con. slab bridges, Route 173, Sect. 134B, Lake Co. F. T. Sheets, hy. engr.

Iowa—May 12, by State Hy. Comn., Ames, two 32 x 24 ft. I-beam bridges, one 15 x 16 ft. timber trestle bridge, Primary Rd. 9 between Waukon and Lansing, Allamakee Co.—5 culverts, U. S. Rd. 71, near Spencer, F.A.P. 218 Clay Co.—two 37 x 24 ft. and three 27 x 24 ft. I-beam span railroad crossing, U. S. Rd. 218, near Van Horne, X-575, Benton Co.—raising end spans, asphaltic plank wearing surface resurfacing overhead crossing, Primary Rd. 11, near Cedar Rapids, X-535, Linn Co. C. R. Jones, aud.

La., New Orleans—June 4, by Public Belt R.R. Comn., Municipal Bldg., combined railroad and hy. bridge over Mississippi River, near here. F. H. Jaubert, secy.-treas. and gen. mgr.; adv. E.N.-R. May 7. Noted Feb. 26.

Me., Bath—See "Contracts Awarded."

Massachusetts—May 12, by Dpt. P. Wks., State House, Boston, 535 ft. bridge to have 3 span deck steel truss with 2 steel girder approach spans, concrete piers, abutments, 1,500 ft. bituminous macadam approaches, between Deerfield and Greenfield. A. W. Dean, Dpt. P. Wks., Boston, engr.

Michigan—May 13, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, F.Br. 2, of 73-6-1, Contrs. 2 and 3, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, two 2½ ft. sidewalks, Saginaw Co., for State Hy. Comn., Lansing.

Minnesota—May 21, by S. Shepard, aud. St. Louis Co., Court House, Bridge C-3-6-1 on Zimmerman Rd., Sect. 6, Twp. 51 North, Range 13 West; Bridge D-4-35-2, on Lismore Rd., Sect. 35, Twp. 52 North, Range 14 West.

Minnesota and Wisconsin—May 26, by State Hy. Dpt., St. Paul, Minn., and State Hy. Comn., Madison, Wis., at Court House, LaCrosse, Wis., constructing West Channel Bridge over west channel Mississippi River from LaCrosse, Wis. and La Crescent, Minn. Engineering Dpt., Madison, Wis., engrs.

New Jersey—May 18, by State Hy. Comn., Trenton, bridge over Hospitality Branch, on State Hy. Route 42, Sect. 5, Folsom Boro, Atlantic Co. A. L. Grover, ch. clk.; adv. E. N.-R. May 7.

New York and New Jersey—May 25, by Port of New York Authority, J. F. Galvin, chn., 80-90 8th Ave., electrical equipment and installing on George Washington Bridge over Hudson River between Fort Washington, N. Y., and Fort Lee, N. J.; adv. E.N.-R. May 7.

N. Y., Brooklyn—May 14, by A. Goldman, Comr. Plant & Structures, Municipal Bldg., New York, furnishing, installing electrical operating system of Harway Avenue Bridge over Coney Island Creek.

O., Cleveland—May 19, by Bd. Comrs. Cuyahoga Co., rein.-con. bridge over Columbus Rd. in connection with Lorain-Central Bridge, incl. 25,400 cu.yd. excav., 7,690 cu.yd. concrete, 368 tons reinforcing steel, 2,800 lin.ft. granite curbing, 5,080 sq.yd. sheet asphalt paving, 300 sq.yd. brick paving, and 3,600 sq.yd. granite block paving, etc. $284,658. W. Watson & Associates, 4614 Prospect Ave., engrs.

Okla., Tulsa — City Comn., E. Logan, aud., Municipal Bldg., bids about May 26, 18 span 1,750 ft. rein.-con. arch bridge, 40 ft. wide, two 5 ft. sidewalks over Arkansas River, at 21st St. $500,000. Wood & Wetten, and V. H. Cochrane, Wright Bldg., engrs. Noted Dec. 4.

Rhode Island—May 20, by State Bd. P. Roads, Providence, constructing State Hy. Bridge 257, Federal Aid Project 58-B, Coventry — State Bridge 260, Federal Aid Project 65-B, Richmond and South Kingstown—widening State Bridge 134, East Providence; adv. E. N.-R. May 7.

Wash., Machias—May 11, by Comrs. Snohomish Co., Everett, steel bridge over Pilchuck River. $35,000. R. D. Alverson, Everett, co. engr.

Wash., Seattle—Bd. P. Wks., bids about May 21, Albro Place Project, incl. concrete viaduct, grading, paving crosstown arterial highway from Georgetown over Beacon Hill to Seward Park. $325,000. R. H. Thomson, city engr.

West Virginia—See "Streets and Roads."

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CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, eighteen 26 ft. span rein.-con. girder bridge on concrete pile bents over Berenda Slough, Madera Co., to Thermotite Constr. Co., San Jose, $30,734. Noted Apr. 2.

Connecticut—J. A. Macdonald, state hy. comr., Hartford, rein.-con. bridge, Windham, to M. A. Gammino Constr. Co., 728 Valley St., Providence, R. I., $58,111. Noted Feb. 26, under "Streets and Roads."

Idaho—State Hy. Dpt., Boise, 3 concrete bridges on Sawtooth Park Hy., Blaine and Lincoln Counties, to R. F. Nichol, Vale, Ore., $23,284. Est. $29,786.

Indiana and Kentucky—Louisville & Nashville R.R. Co., 10th St. and Bway., Louisville, Ky., W. H. Courtenay, ch. engr., 9 river piers for bridge over Ohio River from Evansville, Ind., to Henderson, Ky., to Missouri Valley Bridge & Iron Co., Leavenworth, Kan. Total est. $5,000,000. Noted Feb. 12.

Iowa—State Hy. Comn., Ames, to Lundgren-Reis Co., 125 College St., Des Moines, bridges in Clay Co., $5,549; Winnebago Co., $6,589; Osceola Co., $36,967; bridges, culverts in Madison Co., $13,954—to M. Pluth, Early, culverts, extensions in Clay Co., $3,425; Osceola Co., $8,285—to Flower & Floyd, Eagle Grove, Winnebago Co., $8,866—to J. F. Lee Paving Co., Dubuque, Dubuque Co., $7,580. Grand total $91,215. Noted Apr. 9.

Maine—State Hy. Dpt., Augusta, North Wayne Bridge over Outlet to Lovejoy Pond, Wayne, involving 226 cu.yd. concrete, to W. V. Mitton, Augusta, $6,070—Toddy Pond Bridge, Orland, 411 cu.yd. concrete, to Stewart & Williams, Augusta, $12,436—Village Bridge over East Branch Mattawaumkeag River, Oakville, 450 cu.yd. concrete, to C. McNally, Ellsworth, $11,862—Stimpson Bridge over Little Ossipee River, Limerick and Waterboro, 900 cu.yd. concrete, to H. J. Cyr, Waterville, $25,248—Getchell Bridge over North Branch Brook, Gorham, 163 cu.yd. concrete, to J. R. Partridge, Augusta, $4,288—Mort Bridge over Swift River, Byron, 379 cu.yd. concrete, to U. Metzler, Rumford, $10,986. Grand total $70,890. Noted Apr. 23.

Me., Bath—Maine Central R.R. Co., A. H. Morrill, ch. engr., Portland, substructure and erection of steel for replacement of present 2 deck girder, 1 deck truss span bridge with 4 span deck girder bridge over New Meadows River, own forces. $67,000. Steel has been purchased.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, steel, concrete bridge over Baltimore & Ohio R.R. at Aiken, incl. all earth approaches surfacing, etc., to Harry T. Campbell & Sons Co., Towson, $72,801.

Massachusetts—Metropolitan Dist. Comn., 20 Somerset St., Boston, E. H. Rogers, engr., alteration in abutments, piers of Western Div. and Saugus Branch Bridges, Revere Beach Parkway, Everett and Medford, to J. J. Collins, 44 Orient Ave., East Boston, $21,085.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., rebuilding rein.-con., steel bridge over Midland Div. of New York, New Haven & Hartford R.R., on Morton St., to Coleman Bros., 245 State St., $52,930. Noted Apr. 9.

Michigan—A. L. Burridge, div. engr., Cadillac, F. A. Br. 1 of 4-8-1, 2 rein.-con. abutments, steel deck girders, rein.-con. flooring, Alpena Co., for State Hy. Comn., Lansing. Contr. 2, to Amer. Bridge Co., 1328 Buhl Bldg., Detroit, $4,265; Contr. 3, incl. cement, to J. Leach, Jr., Saginaw, $27,279. Noted Mar. 26.

Michigan—C. A. Miller, Saginaw, div. bridge engr., Saginaw, F. Br. 1 of 77-8-1, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, two 2½ ft. sidewalks, Contr. 3, to H. C. Christman-Burke Co., 1010 Fisher Bldg., Detroit, $24,257, incl. cement; F. Br. 1 of 77-22-1, 2 rein.-con. abutments, steel deck girder, rolled steel sections, rein.-con. flooring, two 2½ ft. sidewalks, Contr. 4, to E. C. Nolan & Son, Detroit, $33,253, incl. cement—F. Br. 1 of 77-8-1, Contr. 2, and F. Br. 1 of 77-22-1, Contr. 3, to American Bridge Co., 1328 Buhl Bldg., Detroit, $4,531 and $4,461 respectively, all in St. Clair Co., for State Hy. Comn., Lansing. Grand total $66,502. Noted Mar. 26.

New Hampshire—State Hy. Dpt., Concord, 390 ft. double deck steel truss girder bridge, Pembroke and Allenstown, to Kittredge Bridge Co., Concord, $66,134—27 ft. span underpass, over deck tie bridge, Allenstown, to Hagen & Thibodeau, Eden Park, R. I., $10,895—164 ft. concrete continuous T-beam bridge, Hooksett, to Robie Constr. Co., Manchester, $17,276. Grand total $94,305.

New Jersey—State Hy. Comn., State Office Bldg., Trenton, bridge, Bergen Co., to United Bridge & Road Co., 419 4th Ave., New York, N. Y., $108,880. Noted Apr. 9.

O., Canton—Stark Co., rein.con., steel bridge, Fulton Rd., to M. E. Lutz, 337 Belleflower Ave. N. W., $26,374. Est. $40,000.

O., Cleveland—New York, Chicago & St. Louis R.R., A. C. Harvey, ch. engr. Terminal Tower, rein.-con. bridge Woodland Ave., to Rice-Jones Co., 1836 Euclid Ave. Est. $100,000.

O., Medina—Medina Co., new concrete bridge over Rocky River, north of Fenns Corner, straightening sharp curve, south of bridge, improving approach to bridge, to J. Hall, Ada. $55,499. Est. $60,000.

R. I., Providence—City, steel superstructure bridge Eagle St. and Quinsley Ave., to New England Concrete Co., 75 Westminster St. Est. $25,000. Noted Apr. 9.

Utah—State Rd. Comn., Salt Lake City, one 117 ft. and one 144 ft. span I-beam bridges on concrete piers on hy. between Moab and La Sal Junction, Grand and San Juan Counties, to Talboe & Co., Provo, $40,214. Est. $55,172.

Utah—State Hy. Dpt., Salt Lake City, 187 ft. concrete and I-beam bridge over Santa Clara River, Washington Co., to Knowlton & Ruper, Kaysville, $25,215. Est. $30,713. Noted Apr. 16 Daily.

West Virginia—See "Streets and Roads."

Wisconsin—State Hy. Comn. and Milwaukee Co., Milwaukee, to McGucken & Vander Heyden, 192 4th St., Milwaukee, Layton Ave. No. 1 Overhead Approaches, $10,702; Rawson Ave. No. 1 Overhead Approaches $7,304; widening Howell Rd. 2 $30,032; South Pine Avenue No. 1 Rd. $32,072; 1.35 mi. South Brust Ave. Rd. 1 $32,522—to Marchese Bros., Milwaukee, Silver Spring No. 3 Rd. Overhead Approaches $8,012; grading, paving 2.47 mi. Good Hope Rd. No. 2 $54,892—to P. N. Cobleigh, Reedsburg, hauling 48,000 cu.yd. surfacing materials, $3,600. Grand total $179,136.

STREETS AND ROADS

BIDS ASKED

California—May 13, by State Hy. Comn., Sacramento, grading, bituminous macadam on crusher run surfacing 1 mi. Santa Cruz Rd., Santa Cruz Co.—removing concrete deck of seven 164½ ft. through steel truss spans of bridge over Santa Ynez River, near Buellton, constructing laminated timber floor and bituminous macadam surfacing, Santa Barbara Co. —replacing three 60 ft. steel truss spans with concrete girder spans, widening two 31 ft., eight 30 ft., two 21 ft. rein.-con. girder approach spans, near Newport Beach, Orange Co. C. H. Purcell, hy. engr.

California—May 15, by C. H. Purcell, engr. State Hy. Comn., Sacramento, bituminous macadam on crusher run surfacing road between point 1 mi. north of Santa Cruz to Santa Cruz, Santa Cruz Co.

California—May 22, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, concrete paving 7.2 mi. Brighton-Mills Rd., Sacramento Co.—bituminous rock borders on 8.7 mi. road between Dunnigan and point 1 mi. south of Arbuckle, Yolo and Colusa Counties—treating with asphaltic rock oil and screenings, 15.5 mi. road between Buckhorn Creek and second crossing Cuyama River, Santa Barbara Co.—bituminous treated crushed gravel or stone surfacing 3.5 mi. French Samp-Stockton Rd., San Joaquin Co.

Calif., Culver City—May 25, by City Council, 2 in. granular warrenite on 4 in. asphaltic concrete paving Zenja Ave. $275,000. G. E. Lee, city engr.

Delaware—May 20, by State Hy. Dpt., Dover, grading, concrete paving 1.5 mi. Contr. 143, Wrangle Hill-Clark's Corner—clearing, grubbing, grading, concrete paving 3.59 mi. Contr. 190, Elliott's School-Smith's Mill—3.8 mi. Contr. 192, Woodside-Rising Sun; adv. E. N.-R. May 7.

Idaho—May 12, by A. Harbour, comr. P. Wks., Boise, grading, gravel surfacing 9,000 cu.yd. Lost River Hy., F.A.P. 7-A Reo. and 7-C, Custer Co., 23,600 cu.yd. Roosevelt Hy., Lincoln and Gooding Counties.

Idaho—May 12, by A. Harbour, comr. P. Wks., Boise, grading, crushed graveling 23,600 cu.yd. Roosevelt Hy. from Shoshone West, Lincoln and Gooding Counties; 9,000 cu.yd. Lost River Hy. from Mackay North, Custer Co.

Illinois—May 12, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, grading, drainage structures, concrete paving 0.8 mi. Route 9, Sect. 48X, Dist. 4, Peoria Co.—1.4 mi. Route 49, Sect. 142X-1 and 2.4 mi. Route 49, Sect. 143V-X, both Dist. 3, Will Co.—0.31 mi. Route 142, Sect. 112, Dist. 7 Jefferson Co.—0.53 mi. Route 78, Sect. 135 W Fulton Co., cement will be furnished by state—grading 9.08 mi. Route 147, Sect. 114A, Dist. 9 Johnson Co. F. T. Sheets, hy. engr.

Ill., Pekin—May 12, by Bd. Comrs. Tazewell Co., 12 ft. gravel surfacing 4.48 mi. Sect. T-MF.T.

Iowa—May 12, by State Hy. Comn., Ames, grading, drainage structures, paving 0.094 mi. U. S. Rd. 55, F.A. 98-B, Winneshiek Co.—0.578 mi. U. S. Rd. 20, P-45 A and B, Woodbury Co.—grading 0.556 mi. Waubonsie State Park Stub, P-737, Fremont Co.—5.3 mi. Primary Rd. 220, P-755, Iowa Co.—gravel surfacing 5.824 mi. Primary Rd. 49, P-502, Adams Co.—15.715 mi. Primary Rd. 13, P.-156, Allamakee Co.—1.082 mi. Primary Rd. 49, P-362, Taylor Co.—State Road Work (under supervision State Roads), grading 0.402 mi. Waubonsie State Park Project 25, Fremont Co.—0.352 mi. Wild Cat Den, State Park Project 17, Muscatine Co.—blade grading 2.23 mi. Rush Lake Park Project 26, Palo Alto Co.—crushed rock surfacing 1 mi. and resurfacing 4 mi. Lacey-Keosauqua State Park, Van Buren Co.—2 rein.-con. box culverts, Wildcat Dam, State Park Project 17, Muscatine Co. C. R. Jones, aud.

Ia., Algona — May 13, at office Auditor Kossuth Co., gravel surfacing secondary roads, incl. 108,000 cu.yd. gravel 1 mi. haul, 814,000 units overhaul, 34,700 cu.yd. stripping gravel pits.

Ia., Ida Grove—May 13, at office Auditor Ida Co., grading, incidental work 8.75 mi. trunk roads.

Ia., Marquette—May 11, by E. M. Donahue, city clk., concrete, cut-back asphalt or tarvia paving 18,000 sq.yd. W. E. Buell & Co., 503 Insurance Exch. Bldg., Sioux City, engrs.

Streets and Roads (Continued)

Md., Baltimore—May 13, by Bd. Awards, concrete paving 9,300 sq.yd. streets listed in Contr. 597. N. L. Smith, Municipal Bldg., hys. engr.

Massachusetts—May 12, by Dpt. P. Wks., Boston, bituminous macadam paving 2,633 ft. hy. Cheshire—4,150 ft. Westboro—5,200 ft. Lynnfield—7,720 ft. Easton—9,800 ft. Agawam, A. W. Dean, Dpt. P. Wks., State House, Boston, engr.

Mass., Cambridge—May 11, by W. R. McMenimen, supt. streets, City Hall, bituminous macadam or sheet asphalt paving Prison Point St., $25,000 or more; sheet asphalt, rein.-con., mastic bedding with granite wearing surface, warrenite bitulithic paving streets, $25,000 or more.

Mass., Lawrence—See "Contracts Awarded."

Mass., Newton—Street Comrs., City Hall, rejected bids constructing Agawan Rd., Sects. A, B and C, to exceed $25,000; and Wedgewood Rd., Sects. A, B and C to exceed $25,000. Noted Apr. 17 Daily.

Michigan—May 12, by W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, grading, shaping, drainage structures, concrete paving 2.931 mi. FO41-32C-3 and FO70-26C-1, Kent Co., for State Hy. Comn., Lansing.

Michigan—May 12, by J. T. Sharpensteen, div. engr., Escanaba, grading, shaping, drainage structures, concrete paving 9.874 mi. FO36-14, Contr. 2 and FO36-14C-3, Iron Co., for State Hy. Comn. Lansing.

Michigan—May 13, by H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, drainage structures, capping, widening existing pavement 10.458 mi. FO25-23C-1 and FO73-29C-1, Genesee Co., for State Hy. Comn., Lansing.

Michigan — May 14, by H. C. Oakes, div. engr., Plymouth, grading, drainage structures 4.173 mi. FO30-19C-1, Hillsdale Co., for State Hy. Comn., Lansing.

Minnesota—May 19, by State Hy. Dpt., St. Paul, grading, concrete paving 94,107 sq.yd. road between Garvin and Tracy, T.H. 7—249,102 sq.yd. road from Winthrop to point 3.5 mi. west of Fairfax, and 138-030 sq.yd. same road from Marshall to point 2 mi. east West Redwood Co. Line, T.H. 14—152,220 sq.yd. road between Madelia and Lake Crystal, T.H. 15 and 16.

Minn., Duluth—May 21, by S. Sheldon, engr. St. Louis Co., Court House, paving 4.07 mi. Job 3-1, Becks Rd. from Gary to S.T.H. 1—1.48 mi. Job 700-1, Gulbranson Rd. and Boundary Ave., extending from S.T.H. 1 to Proctor—1.88 mi. Job 54-1, Hermantown Rd., and extending from Trinity to Haines Rds.

Minn., St. Paul—May 12, by C. A. Carlson, city purch. agt., repaving Summit Ave. between Dale St. and Hamline Ave., and paving Conway St. between Maria Ave. and Mounds Blvd. To exceed $25,000. W. N. Carey, city engr.

Mo., Clayton — May 13, by St. Louis Co. Court House, grading, concrete or macadam paving each side St. Louis Public Service tracks on Midland Blvd. from Lackland Rd. to Marcus Ave., Natural Bridge Rd., Ennis, and Millburn Aves. R. Jablonsky, Court House, co. engr.

Mo., St. Louis—May 12, by Bd. P. Serv., City Hall, grading 14,900 cu.yd. Penrod Ave., $7,600—rein.-con. paving 2,280 sq.yd. Fairview Ave., $12,200 — 1,800 sq.yd. Hampton Ave., $9,360—asphalt on concrete paving 4,650 sq.yd. Loughborough Ave., $22,240—9,640 sq.yd. Dolman St., $44,720—warrenite bitulithic on concrete paving 7,040 sq.yd. LaSalle St., $33,400—paving alleys, $25,000. W. W. Horner, city engr.

Nevada—May 13, by State Hy. Dpt., Carson City, rebuilding shoulders and applying 163,516 gal. asphaltic oil on 7.68 mi. road from Carson City to point 2 mi. east Mound House, Route 2A, Sects. A and A1, Ormsby and Lyon Counties — 582,681 gal. on 31.44 mi. road from Elko to Deeth, Route 1, Sects. B and C, Elko Co.—224,788 gal. on 12.16 mi. road from Robinson Summit to Keystone, Route 2, Sect. C-1, White Pine Co.—grading, crushed graveling 57,000 cu.yd. road from Thousand Springs Creek to Little Salmon River, Route 13, Sect. C3, Elko Co. S. C. Durkee, Carson City, co. engr.

New Jersey—May 18, by State Hy. Comn., Trenton, grading, curbing, bituminous concrete on concrete paving Route 25, Sect. 19-20, Elizabeth, Union Co. A. L. Grover, ch. engr.; adv. E. N.-R. May 7.

N. J., Elizabeth—May 11, by Bd. Freeholders Union Co., Court House, sheet asphalt on concrete paving Wood Ave. and St. George Ave. intersection, Lindeon and Roselle Boros. $25,000. R. Collins, co. engr.

N. J., Newark—May 13, by Bd. Freeholders Essex Co., Court House, rein.-con. on earth subgrade paving 21,000 sq.yd. Parsonage Hill Rd., Millburn and Livingston Twps. $25,000. W. Stickles, Court House, co. engr.

N. J., Wantage—May 9, by Com. Wantage Twp., Wrights Mills, W. H. Sprague, clk., gravel or shale surfacing 12,680 sq.yd. Colesville-New York State Line-Sect. 3. W. J. Hardin, 35 Spring St., Newton, engr.

New York—May 26, by A. W. Brandt, comr. Hys., Albany, improving hys. in Cortland and St. Lawrence Counties—constructing hys. in Montgomery and Westchester Counties—reconstructing hys. in Broome, Livingston, Monroe, Oswego, St. Lawrence and Westchester Counties; adv. E.N.-R. May 7.

N. Y., Delhi—May 21, by W. J. Howland, supt. Hys. Delaware Co., Court House, bituminous macadam, penetration method paving 3.03 mi. Dunraven-New Kingston Rd. Project 14, Contr. 2; adv. E.N.-R. May 7.

N. Y., New York—May 12, by S. Levy, pres. Manhattan Boro. Municipal Bldg., granite block on concrete paving Morris, Hubert, Collister and Great Jones Sts.—sheet asphalt on concrete paving (curb to rail) and granite block paving 10 in. strip parallel and adjacent to outer rails of tracks, Bway. from 40th to 42nd Sts.—laying, relaying sidewalks and curbs when and where directed, Manhattan Boro.

O., Akron—May 19, by F. E. Swineford, dir. P. Serv., setting back curb, widening, concrete sidewalks, granite and stone curbing, drains, vitr. brick on 6 in. concrete paving 26,400 sq.yd. East Exchange St. $190,000. E. A. Kemmler, Municipal Bldg., engr.

O., Cincinnati—May 15, by Comrs. Hamilton Co., concrete curbing, grading, concrete paving 15,100 sq.yd. and 3,000 lin.ft. woven wire guard rail, Brower Rd. from east end present concrete to point 4,800 ft. easterly $63,177. E. A. Gast, Court House, engr.

O., Cleveland—May 8, by Bd. Comrs. Cuyahoga Co., vitr. brick, sheet asphalt or concrete paving Trisket Rd., 2. $237,300 for brick surface. F. Williams, Court House, engr.

Pennsylvania—May 22, by State Hy. Dpt., Harrisburg, grading, macadam and rein.-con. paving 20 mi. roads in Bucks, Chester, McKean, Mercer, Montgomery, Perry and Westmoreland Counties. S. S. Lewis, secy.; adv. E. N.-R. May 7.

Pa., Clairton—May 19, by City, V. E. Ohl, supt. Streets and Pub. Impvts., curbing, sidewalks, paving Glenn, Halcomb, Walnut, 8th and State Sts. $43,000. P. M. Steel, City Bldg., engr.

Pa., Erie—May 8, by M. J. Henry, city clk., City Hall, concrete paving 3,834 ft. Old French Rd. from 34th St. to city line where state work stops. A. N. Aitken, City Bldg., engr.

Pa., Phila.—May 19, by Bureau of Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, grading Homestead and Howell Sts. from Algon to Langdon Sts., Langdon St. from Oxford to Howell Sts., Aindrim St. from Germantown to Wayne Sts.—Schedule B, asphalt paving (assessment work) Ash St. from Almond to Belgrade Sts., Belgrade St. from Orthodox to Lefeve and from Ash to Pratt Sts., Wilmot St. from Livingston to Belgrade Sts., Bristol St. from Philip to 2nd St., Claridge St. from Foulkrod to Harrison St., Foulkrod St. from Howland to Tabor Sts., Harrison St. from Claridge to Tabor Sts., Montour St. from Mayfair to Adams Sts., Rising Sun St. from Bristol St. to Hunting Park, Westmoreland St. from 3rd St. to North Pennsylvania R.R., Wingohocking St. from Hurley to D Sts.—Schedule C, asphalt repaving Haines St. from McMahon to Chew Sts., Master St. from 2nd to Howard Sts., Morris St. from Broad to 17th Sts., Walnut St. from 40th to 41st Sts.—Schedule D, pressed granite block repaving Grays Ferry St. from 36th St. to point 210 ft. westward, South St. from 2nd to Broad Sts., 40th St. (track area) from Spring Garden to Haverford Sts. and from Haverford to Mantua Sts.—Schedule E, gunite repairs on bridges over lines of Reading R.R.—Schedule F, furnishing, delivering terra cotta pipe—Schedule G, furnishing, delivering electrical supplies.

Tennessee—May 15, by State Dpt. Hys. & P. Wks., Nashville, grading drainage structures, concrete paving 38.046 sq.yd. State Hy. 1 between Gorman and McEwen, Federal Aid Project 220-A, Humphreys Co. R. H. Baker, comr.

Tex., Beeville—Bee Co. taking bids alternate types hard surfacing 11 mi. main road from Beeville west to Live Oak Co. line. $140,000. J. S. Fenner, Beeville, resident engr.

Tex., Freeport—City, c/o R. D. Collins, mayor, postponed taking bids to have been opened Apr. 20, paving 86,500 yd. Will readvertise. F. J. Von Zube, 802 Fair Bldg., Fort Worth, consult. engr. Noted Apr. 16.

Utah—May 12, by State Hy. Comn., Salt Lake City, grading, gravel surfacing 15.300 cu.yd. state hy., from Jensen to Utah-Colorado line, F.L.P. 4-A, F.A.P. 96-A, Uintah Co. H. S. Kerr, state hy. engr.

Tex., Rosenberg—May 15, by W. F. Finck, city clk., curbing, guttering, concrete paving 24,000 sq.yd. J. Rady, Waco, consult. engr.

Washington—May 12, at office S. J. Humes, dir. Hys., Olympia, concrete surfacing 4.5 mi. State Rd. 3, Lowden to Touchet, E.F.A.P. 169-C Walla Walla Co.—clearing, grubbing, drainage structures, crushed stone surfacing 1.3 mi. State Rd. 14 south from Manchester, Kitsap Co.—resurfacing, stockpiling crushed stone on 11 mi. State Rd. 9 East Beach to Lairds Corner, Clallam Co.—32 mi. State Rd. 21, Bremerton to Kingston to Pt. Gamble, Kitsap Co.—furnishing crushed stone and constructing 35 mi. State Rd. 10 from Wenatchee to Chelen, Chelan Co.—furnishing crushed stone, construction on existing oiled surface a bituminous seal coat on 14.8 mi. State Hy. 2 from Wenatchee to Waterville, Douglas Co.—30 mi. State Rd. 10 from Wenatchee to Quincy, Douglas and Grant Counties—68 mi. State Rd. 7 from Lincoln Co. line to Burke, Grant Co.—54 mi. State Rd. 7 from Grant Co. line to Davenport, Lincoln Co.—73 mi. State Rd. 11 from Cheney to Franklin Co. line, Lincoln and Adams Counties—bituminous surface treatment 2.5 mi. Lind East, Adams Co. S. J. Humes, dir.

Washington—May 26, by S. J. Humes, dir. Hys., Olympia, concrete paving 4.5 mi. State Rd. 11, Cheney to Four Lakes F.A.P. 133-B, and concrete widening existing road 3.9 mi. State Rd. 11, Walters to Junction State Rd. 2, Spokane Co.—grading, draining 3.3 mi. State Rd. 22, Cedonia North, Stevens Co.—0.2 mi. State Rd. 9, East City Limits of Aberdeen-West-Extension Rd., Grays Harbor Co.—resurfacing and stockpiling 41,380 cu.yd. crushed stone on 34 mi. State Rd. 5, Carmack Bridge to Morse Creek, Yakima and Kittitas Counties — bituminous treated paving 25 mi. road from Plymouth to Kennewick, Benton Co.—furnishing, stock piling 13,000 cu.yd. crushed stone surfacing on 15 mi. State Rd. 2 King Co.

Wash., Aberdeen — Grays Harbor Co. soon takes bids improving roads, bridges. $100,000. J. H. Kirkwood, co. engr.

Wash., Bellingham — Comrs. Whatcom Co. bids about May 8, grading, concrete paving 20,833 sq.yd. Permanent Hy. 5B, Guide Meridian Rd. C. McCoy, Bellingham, co. engr.

Wash., Port Angeles—Bd. Comrs. Clallam Co., bids about May 15, hardsurfacing Joyce Hy. $72,000. F. Sullivan, Port Angeles, engr.

Wash., Port Orchard — May 18, by Comrs. Kitsap Co., grading, graveling Permanent Hy. 14, Olalla Bay Sect. $25,000. J. L. Berry, Port Orchard, co. engr.

Wash., Seattle—See "Bridges."

West Virginia—May 12, by State Road Comm., Charleston, grading, drainage structures, concrete surfacing 3.04 mi. Kanawha County Line-Racine Rd., Project 102, Boone Co.—5.8 mi. Belmont-South Rd., Project 182-B—6.2 mi. St. Marys-Bens Run Rd., Projects 183-B, 58-A and B, both Pleasant Co.—widening, concrete surfacing 3.08 mi. National Rd. from Wheeling to Pennsylvania State Line, Project 2065, Ohio Co. —surface treating 13 mi. Grantsville-Millstone Rd., Project 3056, Calhoun Co.—26.3 mi. Spencer-Glenville Rd., State Route 5, Calhoun, Roane and Gilmer Counties—15.8 mi. Redhouse-Leon Rd., Projects 3326, 3352 and 3256, Mason and Putnam Counties—4.7 mi. Hurricane-Mt. Vernon Rd., Project 3311, Putnam Co.—retread surfacing 5.4 mi. Little Tyler Mountain-Putnam Rd., Project 3134-B, Kanawha Co.—1.5 mi. Redhouse-Leon Rd., Part Project 3326, Putnam Co. —16.45 mi. Harper-Cameron Rd., Project 3354-C, Raleigh Co.—5.09 mi. Harrisville-Ellenboro Rd., Project 119, Ritchie Co.—grading, drainage structures 5.71 mi. Breedlove-Brookside Rd., Project 3520, Preston Co.—7.41 mi. Canfield-Bowden Rd., Project 3443, Randolph Co.—grading, drainage structures, retread surfacing 2.3 mi. Mabscott-Crab Orchard Rd., Project 2022, Raleigh Co.—53,000 lin.ft. wire rope guard rail between Culldon and Barboursville, Project 174-A—680 ft. new floor system on Fudges Creek Bridge 822, Project 174-B, both Cabell Co.—Stoney River Bridge 1263, incl. 130 ft. steel through truss superstructure on concrete substructure, Project 122, Grant Co.—Polk Creek Bridge 1179, incl. 60 ft. concrete arch span, Project 2126, Lewis Co. E. D. Ewell, engr.

Wisconsin—May 14, by State Hy. Comm. and Hy. Coms. Door, Brown, Kewaunee and Marinette Counties, Green Bay, concrete paving 186,224 sq.yd. Green Bay-Sturgeon Bay Rd., Door Co.—94,550 sq.yd. Marinette-Pound Rd., Marinette Co. —114,631 sq.yd. West County Line—Rio Creek Rd., Kewaunee Co.—25,000 sq.yd. Green Bay-De Pere Rd., Brown Co. — crushed graveling 2,100 cu.yd. Shioeton Bear Creek Rd., Outagamie Co.—constructing Embrass River Bridge, Outagamie Co.

Wisconsin—May 13, by State Hy. Comm. and Hy. Coms. Walworth, Waukesha and Racine Counties, Commerce Bldg., Milwaukee, grading, concrete paving 29,184 sq.yd. Waterford-Mukwonago Rd., Racine and Walworth Counties —15,519 sq.yd. Green Bay Rd., Racine Co.—LaGrange—Little Prairie Rd., Walworth Co.

Wisconsin—May 15, by State Hy. Comm. and Hy. Coms. Iron, Vilas, and Price Counties, Court House, Rhinelander, clearing, grubbing, grading, bridging 6.81 mi. Option A and 6.074 mi. Option B, Phillips-Fifield Rd., S.T.H. 13, F. A. P. 4-5-H and 258 Price Co.—grading, concrete paving 68,140 sq.yd. Clear Water-Lake-Eagle River Rd., S.T.H. 32, F.A.P. 380-D, Vilas Co.—grading, crushed graveling 5,245 cu.yd. Mercer-Pine Lake Rd., U. S. Hy. 51, F.A.P. 404-B, Iron Co.

Wis., Hudson—May 14, by G. R. Hosford, city clk., curbing, guttering, concrete paving 22,026 sq.yd. 2nd and 4th Sts. $45,000. Wolff & Coates, 903 Globe Bldg., St. Paul, Minn., engrs.

Ont., Ayr — Village and Waterloo Co. (Kitchener) taking bids concrete paving 1 mi. hy. $28,000. L. S. Lichty, Court House, Kitchener, engr.

CONTRACTS AWARDED

Alabama—L. G. Smith, hy. dir., Montgomery, concrete paving 2 mi. Hartselle and Flint Rd., Federal Aid Project 25 Reopened, Morgan Co.; to Harber Cargile Co., Birmingham, $37,130. Atmore-Perdido Rd., Escambia Co., to Carter Constr. Co., 923 Carter St., Chattanooga, Tenn., $130,123. Noted Feb. 5.

Arizona—State Hy. Dpt., Phoenix, grading, drainage structures, oiling 22.1 mi. Ash Fork-Kingman, Ash-Fork-Flagstaff and Ash Fork-Prescott Hys., to Schmidt-Hitchcock, Box 296, Phoenix, $130,555.

Arizona —State Hy. Comn., Phoenix, oil processing road mix 8.3 mi. Florence-Tucson Hy., F.A.P. 94-E, to R. Pleasant, Luhrs Bldg., Phoenix, $49,532. Noted Apr. 17.

Arizona—State Hy. Comm. Phoenix, improving 16 mi. Florence-Superior Hy. F.A.P. 23-C D and F and oiling, surfacing 15 mi. Florence-Superior Hy., F.A.P. 23-A and B, to Western Gunite Co., 110 South 3rd Ave., Phoenix, $54,954 and $77,762 respectively.

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Streets and Roads (Continued)

Arizona—State Hy. Comn., Phoenix, oil processing 22.5 mi. Apache Co., to Everley & Allison, Des Moines, N. M., $96,947; 9 mi. Coconino Co., to Martter & Bock, 1007 Harvard Blvd., Los Angeles, Calif., $101,709. Noted Apr. 17. Daily.

Arizona—State Hy. Comn., Phoenix, grading, surfacing 4,000 ft. Globe-Safford Hy., to O. F. Fisher, Phoenix, $21,202; 9.2 mi. road Santa Cruz Co., to Stanley Jaicks Co., Tucson, $113,157. Noted Apr. 10 Daily.

California—State Hy. Comn., Sacramento, oil surfacing 47.8 mi. roads in Butte and Plumas Counties, to D. McDonald, 118 G St., Sacramento, $7,616 — 33 mi. Nevada and Sierra Counties, to C. W. Wood, Stockton, $7,461—31.9 mi. El Dorado Co., to J. Casson, Hayward, $4,238—10.9 mi. Lake Co., to C. Kuppinger, Lakeport, $1,314—furnishing, applying heavy fuel oil 31.2 mi. San Bernardino Co., to Square Oil Co., 916 Abode St., Los Angeles, $5,220. Grand total $25,849.

Calif., Eureka — Humboldt Co., emulsified asphalt surfacing 14 mi. roads, to Heafey-Moore Co., 344 High St., Oakland, $23,230. Noted Mar. 26.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, rein.con. retaining wall, storm drains, concrete and asphaltic concrete paving New Hampshire Ave. and 5th St. Impvt. Dist., to L. Honek, 2941 Denby Ave., $28,830.

Calif., San Francisco—State Harbor Comn., Ferry Bldg., improving The Embarcadero, to Fay Impvt. Co., Phelan Bldg. $52,165.

Calif., Santa Rosa — G. P. Sanborn, clk. Sonoma Co., light and heavy oil surfacing 2nd, 3rd, 4th and 5th Supervisorial Dists., as follows, to G. French, Jr., Box 675, Stockton, 7.4 mi. $7,381; to Highway Builders, Ltd., 5.5 mi. $7,227, 11.5 mi. $12,891, 6.9 mi. $6,238. Grand total $33,737. Noted Apr. 9.

Colorado—State Hy. Dpt., Denver, gravel surfacing 9 mi. State Hy. 8, Arapahoe Co., to Lawrence Constr. Co., 112 South Elati St., Denver, $189,624; 4 mi. State Hy. 4, Mesa Co., to Wallace Constr. Co., $54,907. Noted Apr. 9.

Idaho—State Dpt. P. Wks., Boise, grading, drainage structures 1.908 mi. Bannock Hy., Bannock Co., to Union Constr. Co., Ogden, Utah, $7,172. Est. $12,982.

Idaho—Bd. P. Wks., Boise, grading, drainage structures, crushed rock surfacing 3.341 mi. Palouse Hy., Kootenai Co., to D. A. Sullivan & Co., Coeur d'Alene, $39,637. Est. $51,568. Noted Apr. 9.

Ill., Cambridge—Henry Co., grading, drainage structures, concrete surfacing 16,354 sq.yd. Midland Club Rd., M.F.T., to H. A. Resche, Geneseo, $31,272.

Ill., Monmouth—State Dpt. P. Wks., Div. Hys., Springfield, gravel surfacing, grading State Aid Route 6, Sect. M.F.T. and State Route 3, Sect. 4, M.F.T., to C. L. Swords, Peoria, $10,500 and $14,200 respectively—State Aid Route 5 and 15, Sect. 2, M.F.T., to T. O. Miles, 553 Mulberry St., Galesburg, $1,157—box culvert, to C. D. Stratton, Little York, $1,541, all Warren Co. Grand total $27,398. Noted Apr. 9.

Ill., Shelbyville—Shelby Co., grading, paving 3 mi. road from Findlay to connect with State Hy. 169, to Moritz Constr. Co., Effingham, $41,289.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures reinforcing bars, concrete surfacing 27,772 sq.yd. Project 253, Rd. 15, Grant Co., to W. J. Nees Co., Mishawaka, $48,093. Est. $64,359. Noted Mar. 19.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 131,159 sq.yd. Porter Co., to H. P. Downey Constr. Co., Hammond, $250,764 est. $299,341—50,635 sq.yd. Lawrence Co., to Globe Constr. Co., 2307 West Franklin St., Evansville, $111,954 est. $129,432—210,963 sq.yd. Parke and Putnam Counties, to Indiana Road Paving Co., Rochester, $380,426 est. $527,252 — grading, drainage structures 1.6 mi. Jefferson Co., to Myers Bros., Campbellsburg, $99,160 est. $175,573. Grand total $842,304.

Ind., Indianapolis—Bd. P. Wks., asphalt resurfacing North Pennsylvania and West New York Sts., to Union Asphalt Constr. Co., 208 Lemcke Bldg., $29,630.

Ind., Laporte—Bd. Comrs. Laporte Co., concrete surfacing Marthinson Rd., to Gross Constr. Co., Laporte, $20,589 est. $26,591; John Isleman Rd., to Cook Bros., Laporte, $9,916 est. $14,507. Noted Apr. 9.

Ind., Logansport—Cass Co., stone and gravel surfacing John Backus Rd., Harrison Twp., to Gast Constr. Co., Warsaw, $15,295 est. $20,635; gravel surfacing J. Richardson Rd., Adams Twp., to Rosenberry & Gonsaulus, Butler, $6,740 est. $15,074.

Ia., Algona — Kossuth Co., grading 47 mi. local roads, to Bauck Constr. Co., Emmetsburg, $18,000, and to J. V. Elbert, Whittemore, $10,000. Noted Apr. 2.

Ia., Allison—Bd. Comrs. Butler Co., grading 8.228 mi. secondary roads, to Mowbray Co. & Bowers, Waterloo, $12,426.

Ia., Clarinda—Page Co., grading trunk roads, incl. 183,957 cu.yd. excav., 371,140 cu.yd. station overhaul, to G. W. Condon Co., 223 Grain Exch. Bldg., Omaha, Neb., $31,684; 3 box culverts, extensions, to W. Carlson, Essex, $2,443.

Ia., Garner — Hancock Co., grading 115,000 cu.yd. roads to H. Brummond, Kanawha, $5,565—115,000 cu.yd., to Buns Bros., Woden, $5,565—one 36 ft. and one 20 ft. span I-beam bridges, also 4 culvert extensions, to E. A. Kramme Co., 3200 East 8th St., Des Moines, $6,906—5,000 ft. 12- to 24-in. culvert pipe, to Iowa Culvert & Pipe Co., Mason City, $2,830. Grand total $20,866.

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Ia., Keokuk—Lee Co., grading secondary road system, to N. M. O'Neill, Donnellson, $39,960—gravel surfacing secondary roads, to McDougall Constr. Co., Marshalltown, $14,760.

Ia., Lake Mills—City Council, grading, curbing, concrete paving 25,000 sq.yd., to Booth & Olson, 208 Insurance Exch. Bldg., Sioux City, $25,000. Noted Apr. 9.

Ia., Nevada — Storey Co., improving local roads, incl. 77,000 cu.yd. excav., 16,000 cu.yd. stripping, 800,000 units overhaul, to R. Cook, Nevada $42,480, and Russell Chitty, Fernald, $1,688. Noted Apr. 9.

Ia., Onawa—Bd. Comrs., Monona Co., gravel surfacing 7.43 mi. trunk roads, to McDougall Constr. Co., 3927 Floyd Ave., Sioux City, $6,628; grading trunk roads, to C. W. Drew Co., 929 City Natl. Bank Bldg., Omaha, Neb., $18,900. Noted Apr. 2.

Ia., Orange City—Sioux Co., grading secondary roads, to I. Van Buskirk, Hawarden, $5,518—to Clarke Constr. Co., Merrill, $17,070—bridges, to C. DeGroot, Maurice, $8,365. Grand total $30,952.

Ia., Primghar—O'Brien Co., grading secondary road system, to C. W. McNamara, Sioux Falls, S. D., $26,790.

Ia., Rockwell City—Bd. Comrs, Calhoun Co., improving 24 mi. secondary road system, gravel surfacing 14 mi. incl. 16,250 cu.yd. gravel, 103,750 cu.yd. station overhaul, to A. R. Eno, Rockwell, and C. E. Emery, Coon Rapids, grading 10 mi., incl. 57,170 cu.yd. excav., to W. Rodewald, Rockwell City.

Ia., Sioux City—City Council paving 880 sq.yd. 8th St. and 5,000 sq.yd. Hamilton St., to Hensen & Wesley, 1008 15th St., $9,888—3,500 sq.yd. 34th St. and 2,700 sq.yd. 3rd Ave., to Harrington & Jorgensen, 3904 6th Ave., $10,692—13th St. from Douglas to Summit Sts. and Williams Ave. from Warrington Rd. to Whitehouse Ave., to Jensen & Krage, 3722 Jackson St., $16,929. Grand total $37,509. Noted Mar. 26.

Ia., Storm Lake—Buena Vista Co., gravel surfacing 42.5 mi. local roads, to A. L. Albrecht, Storm Lake.

Ia., Toledo — Tama Co., gravel surfacing roads, to McDougall Constr. Co., 3927 Floyd Ave., Sioux Ciyt, $35,074—grading secondary roads, to R. C. Herberg, Marshalltown, $40,366—14 culverts, to A. Melberg, Cedar Rapids, $5,180. Grand total $80,620. Noted Apr. 2.

Ia., Vinton—Benton Co., grading secondary roads, to G. H. Lowe, Cedar Rapids, $37,138; and to A. J. Fleckenstein, Cedar Rapids, $8,041.

Ia., Vinton—Benton Co., improving Roads 18, 42 and 54, incl. 44,500 cu.yd. excav., 236,972 cu.yd. earth haul, 117,000 cu.yd. station overhaul, 14,987 cu.yd. dragline work, to Building Materials Co., 601 South 3rd St., Cedar Rapids, $18,768, to L. S. Holscher, Victor, $5,425, and to Baumgardner & Schroeder, Wapello, $8,404. Grand total $32,597.

Ia., Washington — Washington Co., grading secondary road system, to J. B. Hannahs, Keokuk, $40,580—crushed stone surfacing secondary road system, to Dane Co., Iowa City, $21,179—26 culverts, to Risk Constr. Co., Washington, $12,253. Grand total $74,012.

Kansas—State Hy. Comn., Court House, Ellsworth, grading, culverts, concrete surfacing 3.805 mi. U. S. Hy. 40S, Federal Aid Project 374-D, 20 ft., Ellsworth Co., to Reed & Wheelock, Clay Center, $106,493. Noted Apr. 9.

Kansas — State Hy. Comn., Court House, Mound City, grading culverts 7.412 mi. 7, Federal Aid Project 270-B, and 5.935 mi. 7, Federal Air Project 215-B, Linn Co., 30 ft., to Geiger & Rutherford, Leavenworth, $57,697 and $34,656 respectively. Noted Apr. 9.

Kan., Kansas City—City Council, sheet asphalt repaving Washington Blvd., from 11th to 18th Sts., to Bituminous Paving Co., Railway Exch. Bldg., St. Louis, Mo., $25,462.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 2 mi. Contr. Co-65-24, Caroline Co., to Layfield & Waller Paving Co., Salisbury, $32,994. Noted Mar. 19.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, macadam resurfacing 2.28 mi. Contr. H-112-42, Harford Co., to T. B. Gatch, Belair Rd., Baltimore, $38,695; gravel surfacing 6.55 mi. Contr. Sm-78-84 St. Marys Co., to DeLuca Constr. Co., Dundalk, $39,276. Noted Mar. 26.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 1.7 mi. Contr. D-75-14, Dorchester Co., to Old Line Contg. Co., Chestertown, $28,973; bituminous concrete paving 2.99 mi. Contr. B-189-711 Baltimore Co., to American Paving & Contg. Co., Montebello Ave., $24,288. Noted Mar. 19.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., gravel surfacing 1.23 mi. Contr. Ch.100-82 Charles Co., to H. W. Hewitt, Valley Lee, Va., $7,447 — concrete paving 1.94 mi. Contr. Wo-93-12, Worcester Co., to Hannemann-Burroughs Co., Salisbury, $30,778 — macadam resurfacing 1.96 mi. Contr. W-87-62, Washington Co., to Bester, Long Co., Hagerstown, $23,798. Grand total $62,023. Noted Apr. 9.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 1 mi. Contr. P-162-32 Prince Georges Co., to D. Marine, 236 Albemarle St., Baltimore, $17,219 Noted Mar. 19.

Md., Baltimore—Bd. Awards, concrete paving 20,000 sq.yd. footways listed in Footway Contr. 119, to Aiello Contg. Co., Gough and Dean Sts., $30,810—15,750 sq.yd. road, in vicinity to Prettyboy Dam, known as Armacost Rd., Molesworth Rd. and Falls Rd., Contr. 595, to Mahoney Bros., 1111 Rutland Ave., $31,602—7,800 sq.yd. streets listed in Contr. 594, to Arundel Contg. Co., 910 Trinity St., $15,320 Grand total $77,732. Noted Apr. 9.

Massachusetts—Dpt. P. Wks., A. W. Dean, engr., State House, Boston, bituminous macadam and rein.-con. paving 31,756 ft. hy., Somerset and Swansea, to Sherry Constr. Co., 837 Davol St., Fall River, $177,559; bituminous macadam paving 14,300 ft. North Andover, to M. M. Donough Co., Saugus, $113,652. Noted Apr. 23.

Massachusetts—Metropolitan Dist. Comn., 20 Somerset St., Boston, E. H. Rogers, engr., resurfacing portions Old Colony Parkway, as specified, Boston and Quincy, to M. McDonough Co., Saugus, $15,090.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving in Bournedale Rd., Ward 19, and Alhambera Rd., Ward 20, to M. McGinnis, 65 Pershing Rd., Jamaica Plain, $22,155. Est. $25,000. Noted Apr. 16.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Lasell St., Ward 20, to C. Capone, 11 Wellsmere Rd., Roslindale, $23,548. Est. $25,000 or more. Noted Apr. 9.

Mass., Boston — Dpt. P. Wks., bitulithic paving South Waverly St., etc., Ward 22, to A. G. Tomasello, 250 Stuart St., est. $25,000 bitulithic paving Corinne Rd., etc., Ward 21, to J. F. Beatty, 66 Warren St., Roxbury. Est. $25,000.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Cerdan Ave., West Roxbury, to C. Struzziery, 115 Kittredge St., West Roxbury, $19,080. Est. $25,000. Noted Apr. 16.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Roslindale Rd., Roslindale, to M. McGinnis, 65 Pershing Rd., Jamaica Plain. Est. $25,000.

Mass., Boston—Park Dpt., 33 Beacon St., repairing bituminous pavement on any road in Boston Park System, to Warren Bros. Roads Co., 38 Charles River Rd., Cambridge, $21,280. Est $25,000.

Mass., Boston—Park Dpt., 33 Beacon St., bitulithic paving Castle Island Blvd., South Boston, to A. G. Tomasello, 250 Stuart St., $94,772. Noted Apr. 23.

Mass., Canton — Town, Bd. Selectmen, resurfacing and general repairs to streets, to J. T. Reardon, Canton. Est. $25,000.

Mass., Falmouth—Town, gravel and stone penetration paving Sippewisset and Old Meeting House Rds., to S. W. Lawrence, Falmouth. Est. $25,000.

Mass., Lawrence—Street Dpt., widening Amesbury St., day labor. $25,000 or more.

Mass., Waltham—City, H. F. Beal, engr., concrete sidewalks, curbings, to W. Donlan, 93 Pond St., $20,798. Est. $25,000.

Michigan — At office City Clerk, Muskegon Heights, grading, shaping, drainage structures, concrete paving 1.889 mi. FO61-10C-3, Muskegon Co., to J. R. Edelman Co., Muskegon Heights, for State Hy. Comn., Lansing, $92,328, incl. cement. Noted Mar. 26.

Mich., Detroit — Medina curbstone, 3½ in. sheet asphalt on 8 in. concrete paving Lumley Ave. from McGraw to Kirkwood Aves., to Cleveland Trinidad Paving Co., 715 Hammond Bldg., $21,608; Plainview Ave. from West Chicago Ave. to Western Dr., to Detroit Asphalt Paving Co., 909 Transportation Bldg., $13,385.

Minnesota—State Hy. Dpt., St. Paul, grading, concrete paving 78,160 sq.yd. T.H. 20 from Rochester to Marion, to C. F. Lytle, Sioux City, Ia., $165,077.

Mo., St. Louis—Bd. P. Serv., 208 City Hall, vibrolithic concrete paving 2,855 sq.yd. Dunnica Ave., to Skrainka Constr. Co., Security Bldg., $12,715—770 sq.yd. Glasgow Ave., to Perkinson Bros. Constr. Co., 3237 Carter Ave., $6,073—asphalt paving 2,445 sq.yd. Mardel Ave., to Crean & Scott Constr. Co., 1242 Sublette Ave., $18,441 — 1,485 sq.yd. Robert Ave. to Grand Blvd. to Eugene St. and 1,535 sq.yd. Robert Ave. from Eugene St. to Field Ave., to Asphalt Paving Co., 1328 Sublette Ave., $12,614 and $12,878 respectively—1,545 sq.yd. Nashville Ave., to Trinidad Asphalt Mfg. Co., 600 South Theresa Ave., $3,681—3,625 sq.yd. Ulena St., to Central Paving & Constr. Co., 411 North 7th St., $23,204 — warrenite bitulithic paving 3,460 sq.yd. Iowa Ave., to Granite Bituminous Paving Co., Railroad Exch. Bldg., $25,671 — amitesite paving 6,070 sq.yd. Macklind Ave., to Webb-Boone Paving Co., 5103 Fyler Ave., $40,068. Grand total $160,345. Noted Mar. 19.

Mo., St. Louis—Bd. P. Serv., City Hall, grading, concrete paving alleys in City Blocks 2750 and 2942, to Eyermann Constr. Co., 1210 South Grand Blvd., $3,503 — City Block 4456, to Hogan Constr. Co., 2915 Delmar Blvd., $1,266—City Blocks 1264, 4038 and 5431, to A. Lewald, Inc., 5413 Delmar Blvd. $9,652—City Block 2434, to Perkinson Bros. Constr. Co., 3237 Carter Ave., $1,780—City Block 5179, to Chase Bros. Constr. Co., 5230 Devonshire St., $1,452; City Blocks 3710B and 5180, to Stiers Bros. Constr. Co., 2944 Magazine St., $8,156—City Block 4410B, to Creech Constr. Co., 5619 Natural Bridge Ave., $4,239—City Blocks 3134 and 5344, to W. A. Riley Constr. Co., 6635 Delmar Blvd., $4,257. Grand total $34,305. Noted Apr. 2.

Nevada—Directors Dpt. Hys., Carson City, grading, graveling 11.01 mi. Clark Co., to Patrick Cline, Inc., Las Vegas, $84,642 est. $104,980—8.61 mi. Lyon Co., to Nevada Rock & Sand Co., Inc., Reno, $65,080 est. $49,192—10.14 mi. Churchill Co., to Dodge Bros., Inc., Fallon, 69,923 est. $57,316. Grand total $219,645. Noted Apr. 24. Daily.

New Hampshire—State Hy. Dpt., Concord, 6 in. one course rein.-con. on 8 in. gravel paving 32,022 sq.yd. Mascoma Rd., Newport, to

Streets and Roads (Continued)

A. D. Bridges & Sons, Inc., Hazardville, Conn., $90,199. Est. $108,000. Noted Apr. 9.

New Hampshire—State Hy. Dpt., Concord, 3 in. bituminous macadam on 8 in. stone base course paving 1.832 mi. Central Rd., 20 ft., Hopkinton, to Hagen-Thibodeau Constr. Co., Eden Park, R. I., $52,070 est. $87,000—6 in. one course rein.-con. on 8 in. gravel base course paving 2.47 mi. Mascoma Rd., 20 ft., Franklin, to B. Perini & Sons, Inc., Ashland, Mass., $80,142 est. $121,000—3 in. on 5 in. gravel paving 1.98 mi. Sunapee Lake Rd., 28 ft., Plymouth, to Arborio Road Constr. Co., Inc., 525 Main St., Hartford, Conn., $37,530 est. $57,000. Grand total $169,742. Noted Apr. 22. Daily.

New Hampshire—State Hy. Dpt., Concord, grading, 6 in. one course rein.-con. on 8 in. gravel base course surfacing 76,944 sq.yd. Rockingham Rd. in Derry, Windham and Salem, to A. D. Bridges & Sons, Inc., Hazardsville, Conn., $193,011. Est. $300,000. Noted Apr. 16.

New Jersey—State Hy. Dpt., Trenton, grading, 10 in. rein.-con. paving 15,013 sq.yd. Essex Co., to William Eisenberg & Son, Income Insurance Bldg., Camden, $576,603. Noted Apr. 16.

N. J., Clifton—Bd. Freeholders Passaic Co., Court House, Paterson, grading, concrete paving Valley Rd., to R. S. Sowerbutt, 244 Highland Ave., Paterson, $137,259. Noted Apr. 24 Daily.

N. J., Franklin Lakes — Bergen Co., Court House, Hackensack, grading, bituminous macadam paving Franklin Lakes Rd., to S. Braen & Sons, Nelson Ave., Hawthorne, $68,132.

N. J., Hackensack—Hackensack Impvt. Dist., Municipal Bldg., grading River St., to G. M. Brewster & Son, 253 West Fort Lee Rd., Bogota, $27,631.

N. J., Hackensack—Hackensack Impvt. Co., Municipal Bldg., grading River St., to J. Kinzley Co., Zabriskie St., $21,583. Noted Apr. 2.

N. J., Little Silver—Bd. Boro Council, concrete paving 18,000 sq.yd. Seven Bridge Rd., to Riverside Concrete Co., Riverside, $18,250. Noted Apr. 2.

N. J., Long Beach—Ocean Co., Court House, Toms River, grading, concrete paving 1.75 mi. New Road, to E. Riley Mixer, Goshen, $64,783.

N. J., New Brunswick—Bd. City Comrs., sheet asphalt paving Easton Ave., Handy and Seaman Sts., to Utility Constr. Co., 5 Spring St., $28,011. Noted Apr. 16.

N. J., Pemberton—Pemberton Twp. and Boro, graveling 4.4 mi. South Pemberton-Ong's Hat Rd., in South Pemberton, to Lafferty Bros., Oaklyn, $23,910.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., asphalt block paving University Ave., to L. DiMenna, 4778 3rd Ave., $153,578; granite block paving Morris Ave., to St. George Paving Co., 415 Lexington Ave., $58,847. Subject to approval. Noted Apr. 9.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete paving Cary Ave., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $15,861. Noted Apr. 9.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, paving Delafield St., to N. Vanderbilt, 28 Elizabeth St., West New Brighton, $24,361—Otis Ave., to Vanbro Constr. Co., 24 Elizabeth St., Port Richmond, $20,423—grading sidewalk space, Richmond Rd., to Seaboard Contg. Co., 40 Rector St., New York, $1,983. Grand total $46,767. Noted Apr. 15 Daily.

N. Y., Syracuse—Bd. Contr. & Supply, City Hall, repaving South Clinton and Kirkpatrick Sts., to G. B. Dickinson 309 Basin St., $44,825 and $3,103 respectively; Putnam and Elliott Sts., to Onondago Constr. Co., 831 Lancaster Ave., $10,648. Grand total $58,576.

O., Akron—F. E. Swineford, dir. P. Serv., granite and stone curbing, sewers, 4 in. concrete sidewalks, drains, widening, 4 in. vitr. brick paving 8,100 sq.yd. East, Market St., to Thorpe Constr. Co., 943 Hazel St., $58,334. Est. $83,000.

O., Canton—Sheet asphalt paving Belleflower Ave. S. W., from 11th to 13th Sts., to Harry Wise Co., 1126 11th St. N. W., $25,302 est. $25,000—brick paving Ingram Ave. S. W., from Tuscawaras St. W., and 7th St. S. W., Union Ave. S. W., from 5th to 9th Sts., also Hoover Pl. and Piper Court N. W., to Garaux Bros., 415 9th St. S. W., $30,033 and $34,356 respectively, est. $35,000 and $40,000 respectively—brick paving 1 mi. Bryan Ave. S. W., from Navarre Rd. to 21st St., 140 ft., to General Asphalt Paving Co., Witters Bldg., $47,494 est. $50,000. Grand total $137,185.

O., Canton—Stark Co., brick paving 5.89 mi. North Canton-Canal Fulton Rd., 18 ft., and concrete paving 3.9 mi. Freeburg-Beechwood Church Rd., 16 ft., to General Asphalt Paving Co., Witters Bldg., $190,228 and $92,559 respectively, est. $200,000 and $100,000 respectively—slag surfacing 0.06 mi. Waynesburg-Mapleton Rd., 16 ft., to Cable Co., Inc., 1421 5th St. S. W., $48,108 est. $50,000. Grand total $330,895.

O., Cleveland — To Cleveland Quarries Co., Builders Exch. Bldg., stone sidewalks in Northern Dist. $22,552; Southern Dist. $41,118; Western Dist. $20,062; West Park Dist. $19,696—to M. F. Velotta, 1716 Preyer Rd., cement sidewalks in Northern Dist. $19,787; West Park Dist. $13,719—to P. H. De Santis, 12510 Britton Dr., Southern Dist. $20,352—to Cleveland Concrete Co., Lorain Rd., Western Dist., $17,065. Grand total $174,351. Noted Apr. 27 Daily.

O., Dayton—Montgomery Co., furnishing, applying oil treatment on 1,500,000 sq.yd. gravel roads, to L. P. Cabbett Co., Lockland (Cincinnati), $37,050.

Oklahoma—State Hy. Dpt., Oklahoma City, concrete slab surfacing 5.41 mi. road north of Ada, and 5.58 mi. road south of Canadian River, both 20 ft., Pontotoc Co., to Hyde Constr. Co., Amer. Bank Bldg., Enid, $70,145 and $73,535 respectively, est. $78,000 and $90,000 respectively.

Oregon — Clatsop Co., Astoria, surfacing Jewell-Birkenfeld Rd., to Johnson, Hanson & Johnson, Birkenfeld, $31,316.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 48,850 sq.yd. Route 1, Northumberland Co., to Ashland Constr. & Paving Co., Ashland, $168,807; 102,143 sq.yd. Route 20, Bradford, Tioga and Lycoming Counties, to Donatelli & Donatelli, 7202 Apple St., Pittsburgh, $267,819. Noted Apr. 2.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 10,761 sq.yd. Bucks Co., to Union Paving Co., Broad and Stiles Sts., Phila., $68,459—125,641 sq.yd. Monroe and Pike Counties, to R. G. Lassiter Co., Greensboro N. C., $273,916—56,601 sq.yd. Columbia Co., to F. D. Kessler, Northumberland, $147,035—grading, structures, concrete surfacing 16,680 sq.yd. Montgomery Co., to Colonial Constr. Co., Arrott Bldg., Pittsburgh, $50,058. Grand total $539,468. Noted Apr. 16.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, drainage structures, concrete surfacing 4,921 sq.yd., waterbound macadam surfacing 40,204 sq.yd. Route 556, Sect. 1, Elk Co., to Hagadan Constr. Co. of West Virginia, Bridgeville, $137,637—grading, drainage structures, waterbound macadam surfacing 17,002 ft. Route 704, Butler, Venango and Armstrong Counties, 18 ft., to Jones Constr. Co., Bridgeville, $133,930 — 24,700 sq.yd. Route 310, Berks Co., to H. R. Miller Co., Lancaster, $44,243. Grand total $315,910. Noted Apr. 9.

Pa., Duquesne—City Clerk, Municipal Bldg., grading, sewers, sidewalks, curbing, paving Kennedy and Priscilla Aves., to McCrady Rodgers Co., 300 6th Ave., Braddock, $21,700, and F. H. Crosier, 1612 Lincoln Ave., McKeesport, $1,900. Est. $30,000. Noted Apr. 2.

Pa., New Castle—City Council, brick paving 4 streets, repaving 1 street, to Victor Olsen Constr. Co., Mahoning Bank Bldg., Youngstown, O., $60,000. Est. $80,000.

Pa., Phila.—See "Sewers."

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdoch, dir., asphalt paving (assessment work) T St. from Atlantic to Venango Sts. and Thompson St. from Pickwick to Castor Sts., to Union Paving Co., Broad and Stiles Sts., $3,642 and $3,074 respectively—curbing and footway work 3rd Hy. Dist. and demolition and removal of building on line of Passyunk Ave., 17th St., to Atlas Paving Co., 317 South 6th St., $1,665 and $193 respectively. Grand total $8,575. Noted Apr. 29.

Pa., Titusville — City Council, G. M. Fay, engr., grading, curbing, asphalt paving 2nd St., to State Constr. Co., New Kensington, $20,500.

R. I., East Providence (br. Providence)—Bd. Contr. & Purchase, 235 cu.yd. rock and 800 cu.yd. earth excav., and 250 cu.yd. gravel, Bond Rd., 1,500 cu.yd. earth excav., 250 cu.yd. gravel, Burke St., 1,200 cu.yd. earth excav., and 350 cu.yd. gravel, Rogers Ave., to J. McCormick, 319 Taunton Ave. Est. $25,000. Noted Apr. 9.

Tex., Houston—At office City Secretary, 2 in. asphalt on 6 in. concrete paving 11,050 sq.yd. West Gray St., from Valentine to Taft Sts., to Gulf Bitulithic Co., 2820 Polk Ave., $33,075. Est. $35,000. Noted Apr. 10 Daily.

Tex., Memphis—Comrs. Court, Hall Co., c/o A. C. Hoffman, judge, concrete paving 118,285 sq.yd. roads, to McClung Constr. Co., Fort Worth Natl. Bank Bldg., Fort Worth, $209,883. Noted Apr. 9.

Tex., Waco—City, c/o E. E. McAdams, mgr., warrenite bitulithic paving 26,962 yd., to Central Bitulithic Co., Practorian Bldg., Dallas, $63,723.

Utah — State Rd. Comm., Salt Lake City, rein.-con. paving 4 mi. Mills Junction-Tooele Hy., Tooele Co., to Young & Nelson, Richfield, $99,785. Est. $98,629. Noted Apr. 9.

Virginia—State Hy. Dpt., Richmond, grading, drainage structures, rein.-con. on concrete surfacing 4.42 mi. roads in Princess Anne Co., to Brooks Constr. Co., Norfolk, $107,693; clearing, grubbing, grading, drainage structures, one course macadam surface treating 3.557 mi. Loudoun Co., to R. W. Moore & Co., Staunton, $72,591. Noted Mar. 19.

Va., Richmond — Bd. P. Wks., City Hall, granite spall paving 6 streets, to C. M. Weinbrunn, 1015 North 6th St., $26,206.

Washington—S. J. Humes, dir. Hys., Olympia, grading, drainage structures, clearing, grubbing 4.025 mi. Klickitat Co. to Columbia Power & Investment Co., Inc., Stevenson, $41,817—clearing, grubbing, grading, drainage structures, crushed stone surfacing 24.027 mi. Okanogan Co. to F. G. Redman, 206 South 4th Ave., Yakima, $30,013 — grading, curbing, drainage structures, rein.-con. paving 3.923 mi. Lincoln Co., to Norris Bros., Burlington, $112,771 — grading, drainage structures, rock surfacing 12.964 mi. Klickitat Co., to Lyon & Price, 503 North 14th Ave., Spokane, $91,271. Grand total $275,872. Noted Apr. 2.

Wash., Seattle—Bd. P. Wks., grading, concrete paving West Bertona St., to J. Paduano & Co., 7301 Dibble Ave., N. W., $30,957.

Wash., Wenatchee—Concrete paving 0.5 mi. Wenatchee Ave., 62 ft., to C. A. Powers, Spokane, $61,447.

West Virginia — State Roads Comm., Charleston, improving roads in Braxton Co., to Codell Constr. Co., Louisa, Ky., $40,271—Greenbrier and Lincoln Counties, to Hatfield Constr. Co., Huntington, $127,104 and $111,156 respectively—Project 3134-A, Kanawha Co. and Projects 3284 and 3128, Mingo and Wyoming Counties, to Southern Oil & Tar Co. Clay and River Rds., Louisville, Ky., $7,708 and $15,968 respectively — Nicholas and Preston Counties, to Keeley Constr. Co., Clarksburg, $8,136 and $23,370 respectively—Nicholas Co., to R. F. Kirkman, Charleston, $48,925—Ohio Co., to Consolidated Eng. Co., Wheeling, $37,595—Projects 3247 and 3332-A, also Projects 3418 and 3246, Putnam Co., to Southern Quarries Co., Chillicothe O., $11,271 and $2,432 respectively—Wetzel Co., to S. Polino, Fairmont, $109,760—Preston Co., to Tri-State Eng. Co., Cumberland, Md., $221,200—substructure Bridge 1247, Harrison Co., to Kerr & Bishop, Morgantown, $8,162 — substructure Bridge 1236, Marion Co., to Monty Bros., Charleston, $6,567—superstructure Bridge 1247, Harrison Co., to N. H. Clark, Luray, Va., $11,550. Grand total $791,175. For 189,000 lin.ft. wire rope guard rail in Taylor, Lincoln, Logan and Mercer Counties, to Poling & Shomo, Junior, J. W. Warwick, Williamson, and Edmon Kirby Co., Preston, at $0.28, $0.285 and $0.27 per ft. respectively. Noted Apr. 2.

Wisconsin—State Hy. Comm. and Hy. Coms. Fond du Lac, Ozaukee and Washington Counties, 513 Commerce Bldg., Milwaukee, grading, concrete paving 16.299 sq.yd. Washington Ave. Rd., Ozaukee Co., to Froemming Corp., 2058 Green Bay Ave., Milwaukee, $29,961—98,432 sq.yd. West Bend-Saukville Rd., Washington and Ozaukee Counties, to Schwerm Bros., Milwaukee, $205,906—Van Dyne Overhead Approaches, Fond du Lac Co., to J. Rasmussen & Sons, Oshkosh, $35,306—Grand total $271,173. Noted Apr. 16.

Wyoming—State Hy. Comm., Cheyenne, grading, draining 17.014 mi. Sublette Co., to Morrison Knudson, Boise, Idaho, $70,840—8.05 mi., Niobrara Co., to Martin & Herman, Fuller, Neb., $17,569—12.209 mi., Laramie Co., to Tyler & Baker, Cheyenne, $44,379—1.706 mi., Big Horn Co., to Wilson & Welsh Constr. Co., Cowley, $9,477—7.747 mi. Converse Co. and 1.041 mi., Laramie Co., to J. A. & Elliot Wheatland, $11,844 and $3,424 respectively—6.579 mi. Cheyenne-Wheatland Rd., and oil processing 29.416 mi. Cheyenne-Pine Bluffs Rd., both Laramie Co., to R. Spatz, Hillsdale, $13,243 and $27,046 respectively—38.706 mi., Carbon and Albany Counties, to A. H. Read Constr. Co., Cheyenne, $147,644 — 34.01 mi., Hot Springs and Washakie Counties, to Taggart Constr. Co., Cody, $121,380—26.393 mi., Carbon Co., to A. H. Read Co., Cheyenne, $81,559—24.163 mi., Goshen Co., to Northwest Eng. Co., Rapid City, S. D., $49,606 — reconstructing 12.317 mi., Sweetwater Co., to Green River Lumber Co., Green River, Utah, $70,918—steel bridge on concrete abutments, Washakie Co., to E. Birdsell, Cheyenne, $14,613. Grand total $684,482. Noted Apr. 3 Daily.

Ontario—Dpt. P. Hys., Parliament Bldgs., Toronto, A. A. Smith, engr., concrete paving 8 mi. Contr. 31-07, Kennicott westerly rd., to Ontario Ready Mix Concrete Co., 159 Bay St., Toronto; mixed macadam paving 7 mi. Contr. 31-16, from Cambra westerly, to Gordon Crushed Stone Co., Confederation Life Bldg., Toronto. Est. $300,000. Noted Feb. 5.

Ont., Kitchener — L. S. Lichty, engr., Court House, concrete paving 15,840 sq.yd., to Dufferin Paving Co., foot of Bathurst St., Toronto, at $1.68 per sq.yd. Noted Apr. 2.

Ont., Sudbury—Dpt. Northern Development, Parliament Bldgs., Toronto, retread macadam paving 13 mi. Sudbury-Saulte Ste. Marie trunk road, to Bituminous Spraying & Contg. Co. Ltd., Confederation Life Bldg., Toronto. Est. $65,000.

Ont., Toronto—To Godson Constr. Co. Ltd., 203 Richmond St. W., asphalt paving Cherry St., $2,936; Fleet St., Sect. A, $34,770; Fleet St. Sect. B $36,650; Jarvis St., $12,920—to Constructing & Paving Co., Confederation Life Bldg., Teddington Park Ave., $11,380—to L. P. Acrt, 28 Grove Ave., bitulithic paving Roselawn Ave., $2,646. Grand total $101,302.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Conn., New Haven—City, P. Wks. Dpt., sea wall along Pardee Place, Morris Cove, Westcott & Mapes, 139 Orange St., engrs.

Kan., Winfield—Flood protection. To exceed $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., Apr. 22, rebuilding concrete, steel bridge over Midland Div. New York, New Haven & Hartford R.R., Morton St., from Coleman Bros. Co., 245 State St., $52,930. Noted Apr. 2 Daily.

Mass., Rockport—Town, R. P. Parker, in charge, Town Hall, soon takes bids concrete wall, concrete walk at Long Beach, $38,000. Morse & Dickenson, 25 Washington Sq., Haverhill, engrs.

Tex., Brownsville—Cameron Co., Water Control & Impvt. Dist. 19, irrigation district 9,406 acres land in Adams Garden, near here, being colonized and developed by F. C. Ladd. System includes concrete lined main canal, concrete lined and concrete pipe laterals, no earthen or unlined canals will be permitted, drainage system to be built for removal of rain or excess irrigation water. A. Tamm, Harlingen, engr.

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Excavation, Drainage, Irrigation, Levees, River and Harbor (Continued)

BIDS ASKED

Kan., Wichita—See "Contracts Awarded."

Mass., Chelsea—May 11, by City, F. C. Parrow, chn. com., City Hall, rein.-con. retaining wall, Quigley Playstead, Essex St.

Mo., New Madrid—Drainage Dist. 23, New Madrid Co., bids about June 24, reclaiming drainage ditches, incl. 189,975 cu.yd. excav., 164 cu.yd. fills in spoil banks, 4 concrete catch basins, drain pipe, new bridge, etc. W. E. Davis, Point Pleasant, dist. engr.

Nebraska—May 15, by Lancaster Co. Sanitary Dist. 1, W. C. Frampton, secy., 427 Bankers Life Bldg., Lincoln, deepening, widening Sect. 6-10-7 in southeast quarters, Salt Creek, incl. 358,268 cu.yd. channel excavating. Scott & Scott, 427 Bankers Life Bldg., engrs.

N. Y., New York—See "Sewers."

Ont., London—F. E. Farncombe, engr., Richmond Bldg., bids about June 1, dredging Dingman Creek Drain, Westminster Twp. $35,000.

CONTRACTS AWARDED

Kan., Wichita—City, C. C. Ellis, clk., altering, changing channel Arkansas River, excavating, erecting levee, riprap to straighten and protect east bank river, from Funston Ave. to city limits, incl. 10,000 cu.yd. excav., 20,000 cu.yd. fill, day labor, $25,000.

Mass., Marshfield — Dpt. P. Wks., Boston, placing 6,000 tons stone rip rap and chips in reconstruction jetties at entrance to Green Harbor, to Thos. Whalen & Sons, Inc., 54 Dover St., Whitman, $23,720. Noted Apr. 16.

Missouri—See "Railways."

Nebraska—W. C. Frampton, secy., Lancaster Co. Sanitary Dist. 1, 427 Bankers Life Bldg., widening, deepening southeast quarter Sect. 31-11-7 and northeast quarter Sect. 6-10-7, Salt Creek, to Martin-Day Constr. Co., 312 Little Bldg., $22,999. Noted Apr. 2.

N. Y., Brooklyn—M. Cosgrove, comr. Docks Pier "A," Battery Pl., New York, bulkhead wall between West 30th and West 37th Sts., Gravesend Bay, Contr. 1998, to A. N. Spooner & Sons, Pier 11, North River, New York, $372,-561. Noted Apr. 9.

N. Y., Brooklyn—M. Cosgrove, comr. Docks Pier "A," Battery Pl., New York, bulkhead wall at Mill Basin, Contr. 1948, to A. N. Spooner & Sons, Pier 11, North River, New York, $76,-293. Noted Apr. 9.

Pa., Conway—Pennsylvania R.R. Co., W. D. Wiggins, ch. engr. central region, Pennsylvania Sta., Pittsburgh, dredging harbor Ohio River, to General Contg. Co., Columbia Bank Bldg., Pittsburgh, $18,000. Soon lets contract mechanical equipment, concrete wall, dredging-coal handling equipment, crane. Total est. $350,000.

Bond Elections

Coming Bond Elections

Water Pipe Line Ext., Tank, etc. — Calexico, Calif., $20,000.

Irrigation System — Texas, Cameron County Water Control Dist. 19, $750,000. A. Faime, Harlingen, Engr.

Breakwaters (Two) — Redondo Beach, Calif., $800,000.

Natural Gas Distribution System — Owensboro, Ky., $250,000.

School—Grand Forks, N. D. May 12, $200,000.

Bonds Voted

Waterworks Impvts.—Wilmette, Ill., $100,000.

Waterworks — Collyer, Kan., $24,500. F. E. Devlin, Wichita, Engr.

Water Distribution System — Spring Hill, La., $35,000. E. T. Archer & Co., Kansas City, Mo., Engr.

Additional Water Supply — Lincoln, Neb., $2,400,000. Burns & McDonnell Eng. Co., Kansas City, Mo., Engr.

Sanitary Sewer—Nebraska City, Neb., $25,000. C. A. Shannon, City Hall, Engr.

Swimming Pool—Fairbury, Neb., $25,000.

Power Plant—Oakdale, La., $90,000. F. P. Joseph, Glenmora, Engr.

School—Houma, La., $160,000.

High School—Fayetteville, N. Y., $424,000.

City Hall—Rochester, Minn., $180,000. A. F. Wright, City Clk.

Bonds Defeated

Wells, Mains, Tank, etc.—Dallas Center, Ia., $66,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ark., Forrest City — POST OFFICE — Treas. Dpt. at office Sup. Archt., concrete, brick, stone post office, $85,000.

Ark., Jonesboro—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office, $110,000.

Conn., Greenwich—DREDGING—U. S. Eng., Providence, R. I., 41,500 cu.yd. Greenwich Harbor, $25,000 plus.

Conn., Manchester—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, brick, stone, Main and East Center Sts. $135,-000. Noted Dec. 11.

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D. C., Wash.—SUPREME COURT—At office D. Lynn, archt. of Capitol, soon takes bids general contract United State Supreme Court Building, Squares 727 and 728. Cass Gilbert, 244 Madison Ave., New York, archt. Noted Mar. 12, under "Contracts Awarded."

Idaho, Boise—ELEVATOR—Treas. Dpt. at office Sup. Archt., new passenger elevator in federal building.

Ia., Independence — POST OFFICE — Treas. Dpt. at office Sup. Archt., sketches concrete, brick, stone post office, $85,000.

Mass., Camp Devens—FLYING FIELD—Con. Q. M. flying field, $15,000.

Mass., Palmer—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, brick, stone post office, Park and Central Sts. $115,-000. Noted Dec. 18.

Mass., Taunton—DREDGING—U. S. Eng., Providence, R. I., improving channel Taunton River to 12 ft. deep mean low water up to Wier Bridge. $110,000 appropriated. Noted Feb. 26.

Michigan—DREDGING—U. S. Eng., Detroit, deepening Courses 4, 5, 7 and 8 in West Neebish Channel, St. Mary's River.

Miss., Biloxi—SOLDIERS HOME—Federal Bd. Hospitalization sketches concrete, brick soldiers home, $800,000.

Mo., Caruthersville—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches post office, $80,000.

Mo., Centralia—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches brick, concrete post office, $70,000.

Mo., Farmington — POST OFFICE — Treas. Dpt. at office Sup. Archt., brick, stone, concrete post office, $90,000.

Mo., Jefferson Barracks—QUARTERS—Con. Q. M. rejected bids Apr. 1, non-commissioned officers quarters. Noted Mar. 5.

Mo., St. Louis—POST OFFICE—Treas. Dpt. at office Sup. Archt., rein.-con., steel, brick, stone addition, 17th and Walnut Sts. $1,600,000.

N. H., Claremont — POST OFFICE — Treas. Dpt. at office Sup. Archt., 1 story, basement post office, Broad St. $95,000. Noted Dec. 4.

N. J., Paterson—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by F. W. Wentworth & F. J. Vreeland, 140 Market St., 3 story, basement, brick, steel, Ramapo Ave., Market and Straight Sts. $800,000. J. A. Wetmore, Treas. Dpt., Wash., D. C., assoc. archt. Noted Apr. 30.

O., Cleveland—RIP RAP STONE—May 21, by U. S. Eng., Federal Bldg., Buffalo, rip rap stone reinforcement along lake side 2,500 ft. west breakwater, Cleveland Harbor. Noted Apr. 9.

Wash., Cle Elum—DAM—Dpt. Interior takes bids after May 15 and open same about June 15, earth-graval dam, 125 ft. high, on Cle Elum River, $3,500,000.

Wash., Seattle—DREDGING—U. S. Eng., 422,000 cu.yd. in Chehalis River.

Wash., Seattle—CRANE—Spec. 6482—June 3, by Yards & Docks, Navy Dpt., 250 ton stationary hammerhead crane, electrically operated; 20 ton traveling tower crane, gasoline electric powered; 10 ton traveling gantry crane, with traveling revolving jib, gasoline electric power, at Navy Yard, Puget Sound.

BIDS DESIRED

Arizona—ROAD—May 12, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Calif., grading 12.975 mi. Sect. F, Route 1, Fredonia-Grand Canyon Natl. Forest Rd., Coconino Co.

Arizona—ROAD—May 19, by C. H. Sweetser, dist. engr., Pub. Rds., 508 Ellis Bldg., Phoenix, grading 12.801 mi. Pine-Winslow Natl. Forest Hy., Sect. C, R. 10, Coconino Co.

Colorado—ROAD—May 12, by Dpt. Agriculture, Pub. Rds., Custom House, Denver, improving 2.972 mi. Cochetopa Natl. Forest, Lake Co.

Conn., New Haven—GREEN HOUSE, etc.—May 8, by Dpt. Agriculture, greenhouse and heating plant, Marsh Botanical Garden. Private plans.

D. C., Wash.—TERRACE, etc.—May 28, at office D. Lynn, archt. Capitol, constructing terrace, fountain, garage on Squares 632, 633, 634, 683, and 685, in C St., between New Jersey and Delaware Aves.

Fla., Jacksonville—CLEARING SITE—May 14, by Treas. Dpt. at office Sup. Archt., clearing site. Noted Apr. 9.

Ill., Cairo—DREDGES—June 2, by U. S. Eng., one or two 34-in. steam-driven side wheel pipe line dredges.

Louisiana—DREDGING—June 2, by U. S. Eng., 1st New Orleans Levee Dist., Poland and Dauphine Sts., New Orleans, 4,988,800 cu.yd. in Louisiana and Texas Intracoastal Waterway, Atchafalaya-Vermillion Sect. from Atchafalaya River to Bayou Gregorie; adv. E.N.-R. May 7.

La., Shreveport—PAINT, OIL and DOPE HOUSE—May 28, by Con. Q.M. Barksdale Field, constructing paint, oil and dope house; post exchange (and utilities); photographic laboratory; radio and parachute building, at Barksdale Field; adv. E. N.-R. May 7.

Mass., Springfield—STEEL—May 15, by Commanding Officer Springfield Armory, 200,000 lb. steel for Springfield Armory.

Minn., St. Paul—GUNITING—May 12, by U. S. Eng., guniting 36,000 sq.ft. surface on apron of spillway section at Twin City Lock and Dam, Mississippi River.

Mo., Kansas City—POST OFFICE—May 15, by Treas. Dpt., at office Sup. Archt., 5 story, basement, attic, 265 x 280 ft., rein.-con., brick, steel, stone, Bway. and Pershing Rd. $4,500,000.

New Jersey—DREDGING—May 14, by U. S. Eng., Phila., Pa., 1,915,000 cu.yd. in Delaware River between Burdentown and Trenton.

N. Y., Albany—CLEARING SITE—May 14, by Treas. Dpt. at office Sup. Archt., clearing site.

N. Y., Bath—POST OFFICE—May 27, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. May 7.

N. Y., Buffalo—DIESEL ENGINE—May 14, by U. S. Eng., 1 complete diesel engine generating set.

N. Y., Governors Island—HOSPITAL—June 4, at office Con. Q.M., 39 Whitehall St., New York, hospital at Fort Jay; adv. E.N.-R. May 7.

O., Dayton—PLANER SHAPERS—May 19, by U. S. Govt., c/o Major R. M. Jones, Dayton Airfield, three 24 in. open side planer shapers.

O., Dayton—TOOLS—May 30, by U. S. Govt., c/o Major R. M. Jones, Dayton Airfield, tinners-hand tools for various airports.

O., Fremont — POST OFFICE — May 22, by Treas. Dpt. at office Sup. Archt., constructing U. S. Post Office.

Ore., Astoria—POST OFFICE—June 8, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Pa., Carlisle Barracks—SEWAGE DISPOSAL SYSTEM—May 25, at office Con. Q.M., sewage disposal system.

Pa., Phila.—DIKE—May 21, by U. S. Eng., constructing 3rd section Pea Patch Dike, in Delaware River. Noted Apr. 9.

Pa., Phila.—DREDGING—May 12, by U. S. Eng., 2,860,000 cu.yd. in Schuylkill River between the mouth and Passyink Ave.

Pa., Pittsburgh—STEEL BOATHOUSE—June 1, by U. S. Eng., one 42 x 19.3 x 3 ft. steel boathouse; adv. E. N.-R. May 7.

Tenn., Memphis—BRUSH and POLES—May 26, by U. S. Eng., McCall Bldg., 38,000 cord brush and poles in construction willow-mart revetment.

Tenn., Tullahoma—WATER SYSTEM, etc.—May 9, by U. S. Property & Disbursing Officer, State Capitol Bldg., Nashville, water and sewer systems, cleaning, grading drill ground, constructing store house at Camp Peay.

Utah, Salt Lake City—EXTENDING, etc.—June 8, by Treas. Dpt. at office Sup. Archt., extending, remodeling (except elevators) U. S. Post Office; adv. E.N.-R. May 7. Noted Feb. 26, under "Contracts Awarded."

W. Va., Huntington—DREDGING—May 25, by U. S. Eng., 161,000 cu.yd. in Ohio River below Lock 20, opposite Belleville Island.

P. R., Ponce—POST OFFICE, etc.—June 30, by Treas. Dpt. at office Sup. Archt., U. S. Post Office, Court House; adv. E.N.-R. May 7.

T. H., Pearl Harbor—CRANE—Spec. 6458—June 10, by Yards & Docks, Navy Dpt., electrically operated 30 ton jib crane on steel tower at Naval Operating Base (Submarine Base).

France, Paris—EMBASSY—June 15, by Chief Foreign Buildings, State Dpt., Wash., D. C., embassy, $1,600,000. Delano & Aldrich, 126 East 38th St., New York, archts. Noted Mar. 12.

CONTRACTS AWARDED

Ala., Tuscaloosa — HOSPITAL — Vet. Bu., Arlington Bldg., general contract U. S. Veterans Hospital, to H. B. Nelson Co., Columbus, Ga., $587,792. Noted Mar. 19.

Arizona—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 508 Ellis Bldg., Phoenix, grading 4.341 mi. Graham Co., to H. J. Hagen, Globe, $44,395. Noted Mar. 12.

California—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading, oil and process oil treated on existing crushed rock surfacing, 34.662 mi. Sect. E, Loop Route, Lassen-Volcanic Natl. Park, Tehama and Shasta Counties, to I. J. Ryder, 205 Almaden Ave., San Jose, $131,281. Noted Mar. 19.

California — ROAD — C. H. Sweetser, dist. engr. Pub. Rds., San Francisco, grading 3.085 mi. Calaveras Co., to J. R. Reeves, Route 3, Box 100, Sacramento, $43,668. Noted Mar. 26.

Conn., Niantic—WAREHOUSE—Property & Disbursing Officer, Armory, Hartford, warehouse, 6 kitchens, mess halls, to J. Jaccon, 37½ Main St., Glastonbury, Conn. Noted Apr. 30.

D. C., Wash.—GRANITE FACING, etc.—Executive Officer, Arlington Memorial Bridge, granite facing, etc., for memorial entrance to Arlington Memorial Bridge, to J. Swenson Co., Concord, N. H., $224,500; to North Carolina Granite Corp., Mount Airy, N. C., $185,000; to New England Granite Wks., Westerly, R. I., $117,000. Grand total $526,500. Noted Feb. 12.

D. C., Wash.—POWER HOUSE—Treas. Dpt. at office Sup. Archt., extending, remodeling power house, to U. C. Spratt, Fredericksburg, Va., $49,900.

Ia., Davenport—POST OFFICE—Treas. Dpt. at office Sup. Archt., wrecking buildings on site proposed post office, to L. S. Harris Wrecking Co., 137 North Central Ave., Chicago, Ill. Noted Apr. 9.

Mass., Boston—WHARF—Treas. Dpt. at office Sup. Archt., repairing wharf at Quarantine Station, to A. A. Hersey & Son Co., P. O. Box 101, Boston, $4,490.

Mass., Winthrop — RADIO HOUSE — Treas. Dpt. at office Sup. Archt., 1 story radio house, for U. S. Coast Guard, to F. B. Lovely, 110 Wilson Rd., Nahant, $7,100. Noted Apr. 9.

Michigan—DREDGING—U. S. Eng., Detroit, channel in Saginaw River and Saginaw Bay, to Duluth Superior Dredging Co., foot 45th Ave., Duluth, Minn., $722,343. Noted Mar. 19.

Miss., Greenville—REMODELING—Treas. Dpt. at office Sup. Archt., general contract remodeling, enlarging U. S. Post Office, to Samford Bros., 301 Washington St., Montgomery, Ala., $17,819. Noted Mar. 19.

Nev., Boulder City—WATER SYSTEM—Bureau Reclamation Las Vegas, high pressure water system, to Wheelwright Constr. Co., Ogden, Utah, $38,457. Noted Apr. 9.

Oregon—ROAD—W. H. Lynch, ch. engr., Portland, surfacing 16.321 mi. Canyon City Hy., Grant Co., and 11.053 mi. Canyon City Hy.,

Federal Government Work (Continued)

Harvey Co., both 18 ft., to C. E. Silbaugh, Burns, $57,414 and $36,055 respectively. Noted Apr. 2.

Oregon—ROAD—Pub. Rds., Portland, grading 10 mi. North Santiam Rd., 16 ft., Monon Co., to W. H. Puckett, Boise, Idaho, $138,828.

Pa., Pittsburgh—DREDGING—U. S. Eng., Keenan Bldg., 57,700 cu.yd. in Monongahela River, near here, to General Contg. Co., Columbia Bank Bldg., $63,470.

R. I., Newport—ASSEMBLY—Spec. 6437—Yards & Docks, Navy Spt.; extending assembly shop, to J. R. and J. A. Whelan, 135 Pelham St., $64,000. Noted Mar. 19.

R. I., Woonsocket — POST OFFICE — Treas. Dpt. at office Sup. Archt., altering and constructing 1 story, basement, 77 x 132 ft. post office addition, to A. M. Lundberg, Railroad Exch. Bldg., St. Louis, $105,000. Noted Apr. 23.

Tex., San Antonio—COMPANY BARRACKS—Con. Q. M., 3 story, 60 x 190 ft. company barracks, at Camp Normoyle, to A. J. Rife Constr. Co., 1913 North Harwood St., Dallas, $164,350. Noted Mar. 6 Daily.

Washington—ROAD—Pub. Rds., Portland, Ore., widening 7.5 mi. Mount Baker Hy., Mount Baker Natl. Forest, Whatcom Co., to C. J. Erickson, 1550 North 34th St., Seattle, $59,729.

Wyoming—ROAD—Pub. Rds., Custom House, Apr. 7, grading, surfacing 9.695 mi. Aladdin-Hulett Natl. Forest Rds., Black Hills Natl. Forest Park, Crook Co., to Western Bridge & Constr. Co., 3869 Leavenworth St., Omaha, Neb., $83,188. Noted Apr. 2.

RAILWAYS

PROPOSED WORK

Ill., Belwood (West Chicago P. O.) — See "Grade Crossings."

Illinois—See "Warehouses" under "East St. Louis."

Pennsylvania—W. D. Wiggins, ch. engr. Central Region Pennsylvania R.R. Co., Pennsylvania Sta., Pittsburgh, soon lets contract 2 pedestrians subways and railroad subway, White St. and Pennsylvania R.R., incl. 21,000 cu.yd. excav., 4,550 cu.yd. masonry excav., 25,000 cu.yd. embankment, 3,725 cu.yd. concrete, reinforcing steel, waterproofing at Crafton, Allegheny Co. $490,000. McCulley Eng. Co., Berger Bldg., Pittsburgh boro engr. T. J. Skillman, Broad St. Sta., Phila., ch. engr. system.

Texas—Fort Worth & Denver Northern R.R., subsidiary Fort Worth & Denver City Ry., subsidiary Colorado & Southern Rd., R. G. Gowdy, ch. engr., Denver, Colo., preliminary plans trunk railroad lines, 1 starting at Lefors and running northerly for 7 mi. and other starting at point near Pampa and running 3½ mi. to the north. $60,000.

CONTRACTS AWARDED

Colorado—Denver & Rio Grande Western R.R. Co., A. O. Ridgway, ch. engr., Equitable Bldg., Denver, 14 mi. automatic block signal system between Pueblo and Swallows, day labor. Est. $75,000.

Missouri—Wabash R.R. Co., W. R. Bennett, ch. engr., Exch. Bldg., St. Louis, removing 1,000,000 cu.yd. earth, for new double tracks leading to Wabash R.R. bridge, St. Louis Co., to Walsh Constr. Co., City Trust Bldg., Indianapolis, Ind. Noted Mar. 19.

New Mexico and Oklahoma — Atchison, Topeka & Santa Fe R.R., G. W. Harris, ch. engr., 80 East Jackson Blvd., Chicago, Ill., 108 mi. standard gage railway line from Colmor, N. M. to Felt, Okla., to Sharp & Fellows, Central Bldg., Los Angeles, Calif. $700,000.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Downey — Bd. Comrs. Los Angeles Co. (Los Angeles), 870 ft. concrete tunnel 6 ft. wide, 8 ft. high, to house electric utilities from South Power House at County Farm, near here. K. Muck, Los Angeles, co. archt.

Calif., Palo Alto—City, J. F. Byxbee, Jr., engr., and Southern Pacific R.R. Co., G. W. Boschke, ch. engr. (Pacific Lines), San Francisco, subway at The Embarcadero, incl. 4 vehicular lanes, two 12 ft. sidewalks, 40 ft. bridge over Alma St. $140,000. City to bear two thirds and railroad one third of cost.

BIDS ASKED

N. Y., New York—May 12, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., supply treated ties (Order 15) and special work, (rails, frogs and switches) for Rapid Transit Railroads.

Pa., Crafton — See "Railways, under Pennsylvania."

CONTRACTS AWARDED

Va., Backbone—Chesapeake & Ohio R. R. Co., Richmond, C. W. Johns, ch. engr., cement relining and enlargement 740 ft. tunnel, to Strum & Dillard, 17 South High St., Columbus, O., $306,000.

GRADE CROSSINGS

PROPOSED WORK

Massachusetts — Commonwealth of Massachusetts, A. W. Dean, engr. Dpt. P. Wks., Boston, plans new concrete, steel overhead bridge over Boston & Maine R.R. tracks, in Bernardston and Northfield. To exceed $25,000. Cost to be partly shared by County and Boston & Maine R.R.

BIDS ASKED

Iowa—See "Bridges."

N. Y., Roslyn—Long Island R.R. Co., A. C. Watson, ch. engr., Pennsylvania Sta., New York, bids about July 1, reconstruction bridge carrying Roslyn-Mineola County Hy., under tracks, near station, here. $82,200.

CONTRACTS AWARDED

Ill., Bellwood (West Chicago, P. O.)—Indiana Harbor R.R. Co., La Salle St. Sta., Chicago, O. Gersbach, ch. engr., elevating 1.5 mi. tracks, 3 subways for streets, grade separation over 2 other railroads, to Walsh Constr. Co., 114 West 3rd St., Davenport, Ia., $600,000. Awarded in March.

Wisconsin—State Hy. Comn. and Unemployment Comn., Madison, constructing North Tomah Overhead, Monroe Co., to Hoeppner-Bartlett Co., Eau Claire, $14,117 — Hammer Overhead, Dodge Co., to N. C. Brogan, 738 East Day St., Whitefish Bay, Milwaukee, $12,861—Lake George Overhead, Oneida Co. and West Forrest Junction Overhead, Calumet Co., to Peppard & Fulton, Superior, $13,938 and $26,551 respectively—Husher Overhead, Racine Co. and Bain Overhead, Kenosha Co., to F. H. Krueger, 22 49th St., Milwaukee, $12,143 and $13,783 respectively—Thornton Overhead, to T. J. Vitcenda, 2462 Hoard St., Madison, $16,186—Fonda Overhead, Milwaukee Co., to Bentley Bros., Inc., 1828 West Pierce St., Milwaukee, $76,435—LaValle Overhead, Sauk Co., to R. G. Hase, Spring Free, $18,618—Wittenberg Overhead, Shawano Co., to Jorgenson Constr. Co., Denmark, $31,709 — Rosemere Overhead, Manitowoc Co., to J. C. Basten, Green Bay, $40,985. $277,326. Noted Apr. 20 Daily.

DAMS

PROPOSED WORK

S. D., Huron—City, City Hall, tentative plans dam for storing water and possibly power development in James River. $300,000. Engineer not selected.

BIDS ASKED

Ind., Indianapolis—See "Power Plants."

PIERS AND WHARVES

CONTRACTS AWARDED

Calif., San Francisco—PIER SHED—State Harbor Comn., Ferry Bldg., steel, concrete pier shed at Pier 15, to E. T. Lesure, 87 Ross Circle. $101,480. Noted Feb. 26.

Calif., San Francisco—PIERS, etc.—Bd. State Harbor Comn., Ferry Bldg., raising, reconstructing 3 blocks of The Embarcadero from Mission to Harrison Sts. and bulkhead wharf structures at Piers 16, 18, 20 and 22, incl. settling of seawall by rockfill topped by piles, filling, repaving street, raising to grade portion of streets settled 3 ft. below grade, jacking up piers, extending piles, to M. B. McGowan, 74 New Montgomery St., $105,524.

La., New Orleans—WHARF—Comrs. Port of New Orleans, 200 New Orleans Court Bldg., concrete slabs on Bienville Street Wharf, to Concrete Constr. Co., New Orleans, $76,216. structural steel framing for city delivery shed at Bienville Street Wharf, to Jones & Laughlin Steel Co., New Orleans, $27,106.

N. Y., New York—M. Cosgrove, comr. Docks, Pier "A," Battery Pl., reconstructing pier, foot Market St., to Stillman, Delahanty & Ferris, 1 Exchange Pl., Jersey City, N. J., $11,606. Noted Apr. 16.

AIRPORTS

PROPOSED WORK

Idaho, Boise — Varney Air Lines, C. V. O'Callaghan, mgr., preliminary plans passenger station at airport. $50,000.

Mo., Bridgeton—Bd. P. Serv., City Hall, soon takes bids grading, shaping field, concrete paving entrances, at National Guard and Naval Reserve hangars; widening, extending southern taxi strip with earth asphalt, drains, oil and creosoting portions of field; tile drainage, and paving, shaping Cold Water Creek Diversion Channel, constructing compensating table, at St. Louis Flying Field. $104,400.

BIDS ASKED

Mass., Framingham—See "Contracts Awarded."

Okla., Tulsa—City, E. Logan, aud., Municipal Bldg., bids about May 15, 1 story, 68 x 186 ft., rein.-con., steel administration building at airport. $75,000. Smith & Senter, Philtower Bldg., archts.

CONTRACTS AWARDED

Mass., Framingham—Framingham Airport, Inc., L. F. Gould, pres., Western Ave., 70 x 80 ft., concrete hangar, filling, concrete work, to Praggin Co., Carlton St., Cambridge; grading to be done by day labor. Est. exceeds $25,000. Hulme Eng. Serv., 24 Union Ave., engrs.

GRAIN ELEVATORS

PROPOSED WORK

Tex., Dalhart—GRAIN ELEVATOR—Welch Bros., Dalhart, preliminary plans grain elevator on industrial tracks of Chicago, Rock Island & Pacific Ry.

CONTRACTS AWARDED

Kan., Wellington—GRAIN ELEVATOR—Wolcott & Lincoln, Inc., 1st and Grove Sts., Kansas City, Mo., 40x226 ft. grain elevator, 185 ft. high, rein.-con., 500,000 bu. capacity, incl. cleaning, conditioning equipment, terminal hopper scales, electric power, to Chalmers & Borton, 1016 Baltimore Ave., Kansas City, Mo. Est. $150,000. Noted Apr. 2.

Mo., Kansas City — GRAIN ELEVATOR — Atchison, Topeka & Santa Fe Ry., G. W. Harris, ch. engr., 80 East Jackson Blvd., Chicago, Ill., 4,000,000 bu. grain elevator addition, rein.-con. founds. incl. 7,500 creosoted piles, to P. S. Metcalf Co., 105 West Adams St., Chicago, Ill. Est. $750,000.

Mo., North Kansas City—GRAIN ELEVATOR —Wabash Ry., W. R. Bennett, ch. engr., Exchange Bldg., St. Louis, and Uhlmann Grain Co., Bd. Trade Bldg., Kansas City, 1,000,000 bu. grain elevator addition, rein.-con., to Burrell Eng. & Constr. Co., Daily News Plaza Bldg., Chicago, Ill.

Okla., Blackwell — GRAIN ELEVATOR — Blackwell Mill & Elevator Co., 500,000 bu. grain elevator, to Burrell Eng. & Constr. Co., 1 North Canal St., Chicago, Ill., $100,000.

Okla., Blackwell—GRAIN ELEVATOR—Midland Flour Milling Co., Bd. Trade Bldg., 400,000 bu. rein.-con. addition, to Burrell Eng. & Constr. Co., Daily News Plaza Bldg., Chicago, Ill. Noted Apr. 23.

Okla., Enid — GRAIN ELEVATOR — Enid Terminal Elevator Co., 1,000,000 bu. addition, to Jones-Hettelslater Co., 600 Mutual Bldg., Kansas City, Mo. $250,000.

Okla., Shawnee—GRAIN ELEVATOR—Shawnee Milling Co., J. Lloyd Ford, pres., 300,000 bu. rein.-con. addition, to Jones-Hettelsater Constr. Co., 600 Mutual Bldg., Kansas City, Mo.

POWER AND LIGHTING

PROPOSED WORK

Arizona—Arizona Electric Lighting & Power Co., Holbrook, preliminary plans 40 mi. high tension transmission line from Holbrook to Winslow, via Joseph. $50,000.

Mo., Centralia—Missouri Utilities Co. granted franchise natural gas system. Private plans.

Oklahoma—Cimarron Utilities Co., Guyman, granted franchise 53 mi. 5½ in. 250 lb. gas transmission line from wells near Guyman to Boise City, also intermediate distribution system in Boise City. L. J. Roberts, assistant genl. mgr.

Oklahoma—Consolidated Gas Co., Hales Bldg., Oklahoma City, preliminary plans 50 mi. 6 in. gas line to serve Okarche, Waukomis and El Reno. $75,000. Private plans.

Okla., Haskell — G. S. Wilson preliminary plans natural gas system. $25,000. Private plans.

Okla., Red Oak—Franchise election May 18, natural gas distribution system to Spiro Gas Co. $30,000. Private plans. J. H. Snowder, mayor.

Okla., Vinita—Pub. Serv. Co. of Oklahoma, 1600 South Main St., Tulsa, granted 25-year franchise electric distribution system. $60,000 Private plans.

Pennsylvania—Pennsylvania Electric Co., 535 Vine St., Johnstown, A. Hickling, in charge, subsidiary Associated Gas & Electric Co., 61 Bway., New York, 33,000 volt transmission line, 3 mi. wood poles in Allegheny National Forest, Warren Co.

Utah — Utah Power & Light Co., G. M. Gadsby, pres., Kearns Bldg., Salt Lake City, preliminary plans 61st unit steam power plant on Utah Lake. $4,000,000. Total $12,000,000. J. A. Hale, Salt Lake City, ch. engr.

BIDS ASKED

New Jersey—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Holyoke—City, Electric Light Dpt., lighting system on Dwight St., incl. lighting standards, to Wetmore Savage Electric Supply Co., 76 Pearl St., Boston; conduits, to Roland T. Oakes Co., 271 Appleton St., Holyoke; brick manholes, to J. J. O'Neill & Co., 89 Bowers St., Holyoke. Est. $45,000.

New Jersey—Public Serv. Co. of New Jersey, Terminal Bldg., Newark, 200 mi. gas pipe line in Jersey City, Newark, Paterson, East Rutherford, etc., day labor and separate contracts.

New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, power equipment for Lines A and B, Routes 101 and 109, Independent System City-Owned Rapid Transit Railroads, Manhattan and Brooklyn Boros, to General Electric Co., 120 Bway., New York. $2,158,000. Noted Apr. 2.

New York—Niagara-Hudson Power Corp., 15 Broad St., New York, 661 mi. aluminum transmission cable for power transmission line from Albany to Poughkeepsie, to U. S. Aluminum Co. (Aluminum Corp. of America), Oliver Bldg., Pittsburgh, Pa.

PARKS AND SPORTS

PROPOSED WORK

N. J., Clifton—Bd. Educ., High School, preliminary plans municipal stadium, playground near high school. $25,000 or more. Lee & Hewitt, 152 Market St., Paterson, engrs.

N. J., Deal—Bd. City Comrs., City Hall, bath house group, on 300 x 900 ft. site, Phillips and Ocean Aves. $150,000. Maturity probably soon. Architect not selected.

N. J., Paterson—Bd. Recreation Comn., City Hall, municipal playground, incl. grading, concrete walks, seats, 12th Ave. section. $25,000. H. J. Harder, city engr.

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Parks and Sports (Continued)

N. J., Paterson—Bd. City Comrs., City Hall, preliminary plans rein.-con. stadium, 7,500 seating capacity. $100,000. Fanning & Shaw, 49 Ward St., archts.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, athletic field, at Abraham Lincoln High School. $116,000. C. W. Martin, Flatbush Ave. extension and Concord St., archt.

N. Y., Jamaica—H. Turck, 151 West 46th St., swimming pool, Van Wyck Blvd. and 101st Ave. $40,000. Private plans.

N. Y., New York — Morris Bienenstock and Bronxdale Swimming Pool, Inc., plans by Shampan & Shampan, 188 Montague St., Brooklyn, amusement park, sports, tunnel, Neil and Barnes Aves. at New York, Westchester and Boston Ry. tracks. To exceed $150,000.

BIDS ASKED

Okla., Tulsa — Bd. Comrs. Tulsa Co. bids about May 17, 100 x 500 ft., fireproof grandstand, at Fairgrounds. $175,000. Former bids rejected. Endacott & Goff, Wright Bldg., archts. Noted Apr. 16.

CONTRACTS AWARDED

Ia., New Hampton—City Council, general contract 120 x 240 ft. swimming pool, incl. 400 ft. low wall and scum gutter, 12,000 sq.ft. 6 in. concrete floor, 6,000 sq.ft. 4 in. concrete beach, bath house, filter house, accessories and laying pipe line to R. A. Stolz Constr. Co., New Hampton, $15,635 and $744 respectively; wiring, to Smith Tire & Electric Co., $905. Grand total $17,285. Noted Apr. 2.

Me., Gorham—Town, School Com. and Bunker & Savage, archts., 256 Water St., Augusta, 1 story, brick gymnasium, at Senior High School, to M. J. Greene Constr. Co., 39 Congress St., Portland. Est. $25,000. Noted Apr. 16.

Mass., Boston — Park Dpt., 33 Beacon St., municipal golf course, Grew Estate, West Roxbury and Hyde Park, to A. G. Tomasello, 250 Stuart St., $207,674. Noted Apr. 23.

Mass., Brookline—Town, Park Comrs., 2½ story, brick, stone field house, Pudderham Playground, to Frankini Bros. Co., Inc., 30 Mystic Ave., Medford, $63,900. Est. $72,000. Noted Apr. 16.

Mass., Foxboro—Town, H. C. Read, chn. Bd. Selectmen, athletic field, to J. H. Cotter, 44 Fuller St., West Newton. Noted Feb. 12.

Mass., Weston — Cambridge School, J. R. French, 36 Concord Ave., altering and constructing gymnasium addition, Trapelo Enclave near West St., to Central Eng. & Constr. Co., 210 Main St., Pawtucket, R. I. Est. $25,000.

N. H., Hanover—Dartmouth College, Athletic Council, general contract 2 story, brick squash court building, to C. D. Marsh Constr. Co., Woodsville; squash court, to Brunswick Balke Callender Co., 314 Stuart St., Boston, Mass. Est. $75,000.

N. J., Belmar—Belmar Ultra Violet Swimming Pool, c/o R. Kruger, archt., 60 Branford Pl., Newark, general contract 2 story, basement, brick, steel, cement, stucco swimming pool, bath house, Ocean and 5th Aves., to Standard Constr. Co., 94 Boylan St., Newark. Est. $150,000.

N. Y., Long Island City—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, paving walks Highland Park, to Gifford Constr. Co., 161-1 Jamaica Ave., Jamaica, $18,698; improving athletic field, Astoria Park, to Brugel Contg. Co., 1154 Cypress Ave., Ridgewood, $17,119. Noted Apr. 16.

N. Y., New York—Parks Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, excavating tree pits, James Lyons Park, to T. DiRoma, 33 Evelyn Pl., $650. Noted Apr. 16.

HEATING AND VENTILATING

PROPOSED WORK

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, enlarging heating at State School. $35,000-$40,000. Engineer not selected.

BIDS ASKED

N. J., Helmetta—May 13, by Bd. Educ., heating and ventilating systems in boro school. $25,000. A. Merchant, 1 Elm Row, New Brunswick, engr.

CONTRACTS AWARDED

Mass., Dover—Town, E. J. Comiskey, chn. comn., heating, in Junior and Senior High School, Springdale Ave., to Barber Co., 26 Warrenton St., Boston; plumbing, to W. N. McKenna & Co., 79 Chestnut St., Boston; electrical work, to James Wilkinson & Co., 206 State St., Boston. Est. $25,000. Noted Apr. 23, under "Schools."

N. Y., Flushing—Bd. Educ., 500 Park Ave., New York, heating P. S. 24, Holly Ave., to H. Starkman & Bro., 132 Brook Ave., New York, $52,962; plumbing, to W. J. Endres, Inc., Grand Central Terminal, New York, $19,000; electrical work, to Tucker Electric Co., 124 East 25th St., New York, $13,145. Grand total $85,107. Noted Mar. 19.

UNCLASSIFIED

PROPOSED WORK

N. Y., New York—COMFORT STATION—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., comfort station, Ogden and Jerome Aves. $40,000. C. S. Clark, 441 East Tremont Ave., archt.

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N. Y., Schoharie—ASPHALT PLANT—Schoharie Stone Corp. expending $75,000, hot lay and cold lay asphalt mixing plant.

Pa., Denbo—BULK DISTRIBUTION PLANT—Gulf Oil & Refining Co., Frick Bldg., Pittsburgh, bulk oil distribution plant. $60,000. Owner will probably build by day labor and separate contracts.

Tex., San Antonio — SUB-DIVISION DEVELOPMENT — Beverly Hills Co., c/o N. S. Dickinson, pres., Western Natl. Bldg., preliminary surveys developing "Beverly Hills" incl. street paving, natural gas system, water lines, fire protection plugs, sanitary sewers, electric system. $200,000. Private plans.

Utah and Idaho—GAS PIPE LINE—Wasatch Gas Co., L. Fitzpatrick, vice pres., 45 Main St., Salt Lake City, natural gas (welded steel) pipe line from Ogden, Utah to Pocatella, Idaho. Project in abeyance. **Maturity 1932.** Noted Jan. 8.

Ont., Kitchener—ASPHALT MANUFACTURING PLANT—Standard Paving & Materials Ltd., Toronto, asphalt manufacturing plant. $100,000.

Ont., London — COAL CHUTES — Canadian Pacific Ry., J. M. R. Fairbairn, ch. engr., Montreal, Que., new coal chutes. $65,000.

BIDS ASKED

N. Y., Creedmoor—ELEVATORS—June 3, by Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevators and dumbwaiters, Creedmoor Div. Brooklyn State Hospital; adv. E.N.-R. May 7.

N. Y., Marcy—ELEVATORS—June 3, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevator, industrial building, Marcy Div. Utica State Hospital; adv. E.N.-R. May 7.

N. Y., Orangeburg—ELEVATORS—June 3, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevators, dumbwaiters, Rockland State Hospital; adv. E.N.-R. May 7.

N. Y., Ossining—ELEVATORS—May 29, by Dpt. Correction, State Office Bldg., Albany, electric elevators, Shoe Shop, Sing Sing Prison; adv. E.N.-R. May 7.

N. Y., Wingdale—ELEVATORS—June 3, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevators, dumbwaiters, Harlem Valley State Hospital; adv. E.N.-R. May 7.

CONTRACTS AWARDED

Calif., San Quentin—FERRY SLIP—Richmond-San Rafael Ferry Co., 564 Market St., San Francisco, 235 ft. ferry slip, creosoted wood piles, to A. W. Kitchen, 110 Market St., San Francisco, $90,000.

Ia., Newton—CULVERTS—Jasper Co., 48 pipe culverts, to Iowa Concrete Products Co., Des Moines, $4,775; 41 culverts, 1 pony truss, to J. W. Schroyer, Baxter, $17,820; 5 culverts, to J. D. Palmer, Kellogg, $740. Grand total $23,335.

Kan., Kansas City — GRAIN ELEVATOR — Chicago, Rock Island & Pacific R.R. Co., La Salle St. Sta., Chicago, Ill., W. H. Peterson, ch. engr., and Simonds-Shields-Lonsdale Grain Co., Bd. Trade Bldg., lessee, general contract 1,300,000 bu. grain elevator, 117 ft. high, irregular sized rein.-con., incl. head house, conveyor system, changes in dust collecting system, grain drying system, concrete pile found., to James Stewart Corp., 343 South Dearborn St., Chicago, Ill. Est. $300,000. Noted Apr. 23.

Mass., Brockton—SILOS—Brockton Ice & Coal Co., 27 Lawrence St., four 210-ton coal silos, Lawrence St., to L. H. Blouch, Merchantville, N. J. Est. $25,000.

Mass., Everett—COAL HANDLING BUILDINGS—New England Fuel & Transportation Co., 250 Stuart St., Boston, 3 story, steel, concrete, Rover St. extension, to Koppers Constr. Co., Koppers Bldg., Pittsburgh, Pa. Est. $40,000.

N. Y., Buffalo — TUNNEL — University of Buffalo, 2,200 lin.ft. 6 x 6 ft. rein.-con. tunnel, Main St., to A. Cervi, 85 Roma Ave., $35,000.

N. Y., Long Island City—ELEVATORS—Morse Realty Co., 45-72 Parsons Blvd., elevators for apartment and alterations 46th St. and 43rd Ave., to Otis Elevator Co., 214 Clinton St., Brooklyn. Est. $35,000.

N. Y., Long Island City—ELEVATORS—Coyne Constr. Co., 3417 34th Ave., elevators apartments, stores and alterations, 29th St. and 34th Ave., to Otis Elevator Co., 124 Clinton St., Brooklyn. Est. $40,000.

N. Y., New York—FERRY RACKS—A. Goldman, comr. Plant & Structures, Municipal Bldg., ferry racks at South St., to Allen N. Spooner & Son, Pier 11, North River, $62,893. Noted Apr. 16.

Utah, Salt Lake City—TOURIST LODGE—Relf Hotel Corp., G. O. Relf, pres., tourist lodge, cottages, dormitories, lunch counter, coffee shop, to H. J. McKean, Inc., Deseret St. Est. $95,000.

MATERIALS

PROPOSED WORK

ASPHALT—Ticonderoga, N. Y.—City, J. Gunning, mayor, soon takes bids 2,000 tons premixed cold laid asphalt paving material.

BIDS ASKED

CEMENT—**Los Angeles, Calif.**—Bd. Supervs. Los Angeles Co., taking bids 1,300 bbl. cement for use in connection with culvert construction on Thompson Creek at Fulton Rd. in Pomona.

REINFORCING STEEL—**Los Angeles, Calif.**—Bd. Supervs. Los Angeles Co., taking bids 1,000 lb. ½ in., 1,000 lb. ⅝ in., 20,500 lb. ¾ in., 11,175 lb. ⅞ in., 40,500 lb. 1 in., 25,700 lb. 1¼ in., 500 lb. 1½ in. square deformed reinforcing bars for use in connection with culverts on Thompson Creek on Fulton Rd. in Pomona.

OIL, ROCK and SCREENINGS — **Sonoma, Calif.**—May 13, by H. Gottenberg, city clk., 60 bbl. light oil, 20 tons heavy oil, 150 tons rock, 100 tons screenings.

ROAD OIL—**Hartford, Conn.**—May 12, by Bd. Contr. & Supply, at Mayor's Office Municipal Bldg., 250,000 gal. more or less road oil with 45% to 55% asphaltic base. J. S. Bush, secy. adv. E. N.-R., May 7.

ASPHALT EMULSION—**Minneapolis, Minn.**—May 14, by F. S. Gram, city purch. agt., 100,000 asphalt emulsion for paving Dpt. N. W. Elsberg, city engr.

BRIDGE LUMBER—**Minneapolis, Minn.**—May 15, by F. S. Gram, city purch. agt., 258,000 bd. ft. bridge lumber for Engineering Dpt., incl. 129,000 ft. 2 x 4½ x 12 ft. and other sizes; 1 concrete mixer; 2 power loaders for Paving Dpt.

SCREENED SLAG, STONE CHIPS, etc.—**Cleveland, O.**—May 8, by Bd. Comrs. Cuyahoga Co., 3,000 tons screened slag or 3,900 tons stone chips; 40,000 gal. tar, asphalt or asphaltic emulsion; 480 tons slag or stone for various roads. $15,000.

CONTRACTS AWARDED

SAND—**Hartford, Conn.**—J. S. Bush, secy. Bd. Contr. & Supply, City Hall, 15,000 cu.yd. sand, to M. H. Kehoe, East Hartford, $8,200.

STEEL PIPE—**Detroit, Mich.**—City, Dpt. Water Supply, 735 Randolph St., 800 tons 72 in. steel pipe, to Alco Products, Inc., 220 East 42nd St., New York (subsidiary of American Locomotive Co., Dunkirk, N. Y.).

ROAD OIL—**Liberty, Mo.**—Clay Co. 500,000 gal. road oil, to Imperial Trucking Co., 1900 Central Ave., Kansas City, at $0.427 per gal.

ASPHALT, etc.—**Newton, N. J.**—Town Comm., Spring St., 10,000 gal. asphalt applied, to Union Bldg. & Constr. Co., 150 Prospect St., Passaic, $1,390; 10,000 gal. Grade B tar applied, to Dosch King Co., 30 Clinton St., Newark, $1,500; 500 tons limestone dustless screenings, to Linestone Products Corp. of America, 93 Spring St., Newton, $920. Grand total $3,810. Noted Apr. 9.

ALUMINUM CABLE — **New York** — See "Power and Lighting."

WIRE ROPE GUARD RAIL—**West Virginia** —See "Streets and Roads."

EQUIPMENT

PROPOSED WORK

CARGO HOIST—**Oakland, Calif.**—City Port Comn., Oakland Bank Bldg., rejected bids Mar. 10, cargo hoist. Will readvertise.

BIDS ASKED

ROAD ROLLERS—**Minneapolis, Minn.**—May 18, by F. S. Gram, city purch. agt., three 10 ton and one 5 ton road roller; 1 skimmer scoop, power operated, ¾ to 1 yd. capacity. N. W. Elsberg, city engr.

POWER SHOVEL—**Red Wing, Minn.**—May 20, by C. T. Taylor, aud. Goodhue Co. one ¾, 1, or 1 yd. capacity power shovel.

REGULATOR—**Woodville, Miss.**—May 10, by Bd. Aldermen, one voltage regulator for 4 kva. and 90 kva. alternators with 7½ and 10 kw. exciters shunt wound.

TRACTOR—**Finley, N. D.**—May 14, by Steele Co., one 30 caterpillar tractor. G. J. Mustad, co. aud.

MANHOLE COVERS and FRAMES — **New York, N. Y.**—May 15, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., c.i. manhole covers, frames, Agreement "KP."

STOKERS—**Shaker Heights, O.**—May 25, by Bd. Educ., stokers for 2 boilers.

CRANE and COAL HANDLING EQUIPMENT —**Conway, Pa.**—See "Excavation, Drainage, Irrigation, Levees, River and Harbor, under Contracts Awarded."

WATERWORKS GATE VALVES — **Toronto, Ont.**—June 2, by A. Stewart, mayor, City Hall, 16, 20, 24, 30, 36 and 42 in. waterworks gate valves. $15,000. R. C. Harris, City Hall, engr.

CONTRACTS AWARDED

REFINERY EQUIPMENT — **Point Breeze** (mail West Philadelphia), **Pa.**—Atlantic Refining Co., 620 South Broad St., Phila., 22 exchangers, and refinery equipment for Point Breeze and other refineries of company, to Alco Products Co. (subsidiary Amer. Locomotive Co.) Dunkirk, N. Y. Est. exceeds $100,000.

FOREIGN

China, Nanking — Methodist Theological Seminary, c/o Methodist Episcopal Church Bd. Foreign Missions, 150 5th Ave., New York, theological seminary. To exceed $3,000,000. **Maturity about 1933.**

Mexico, Monterrey—Cerveceria del Norte, S. A. Monterrey, plans 2 story, brick, steel, concrete brewery, 10,000 bbl. per mo. capacity. $300,000. Private plans.

Jerusalem—Palestine Fund, c/o J. D. Rockefeller, Jr., 26 Bway., New York, plans museum for antiques of the Holy Land. $2,000,000. **Maturity soon.**

Union Socialist Soviet Republics — Soviet Government, c/o Amtorg Corp., 261 5th Ave., New York, oil refining equipment for plant in Caspian Sea District, to Alco Products, Inc., (Amer. Locomotive Co.), Dunkirk, N. Y. Est. $1,250,000.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Mass., Lynn — Hotel Lenox, Inc., V. M. Kavanaugh, pres., 71 Spencer St., bids first week in May, 3 story, basement, 90 x 140 ft., brick, steel hotel, plain found., Broad and Exchange Sts. To exceed $150,000. G. A. Cornet, 14 Central Ave., archt. Noted Apr. 23.

Mass., Medford (br. Boston)—M. O'Hare, 323 Mountain Ave., Revere, taking bids (selected list contractors), 3 story, basement, 75 x 160 ft., brick, artificial stone, High St. $150,000. B. E. Porter, 209 Washington St., Boston, archt.

N. J., Jersey City—See "Contracts Awarded."

N. J., North Bergen — See "Contracts Awarded."

N. Y., Flushing—See "Contracts Awarded."

N. Y., Hollis—See "Contracts Awarded."

N. Y., Jamaica—See "Contracts Awarded."

N. Y., Laurelton—See "Contracts Awarded."

N. Y., Long Island City — See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., New York—S. Lippman, bids in June or later, general and separate contracts 12 story, 310 East 55th St. To exceed $600,000. G. G. Miller, 545 5th Ave., archt.

N. Y., St. Albans—See "Contracts Awarded."

N. Y., Woodside—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Jersey City—Park Realty Co., 140 Montgomery St., rebuilding 4 story, basement, brick, steel, Van Vorst Park and York Sts., separate contracts. $150,000. A. Davis, 140 Montgomery St., archt.

N. J., Leonia—Beechwood Corp., general contract 5 story, basement, brick, steel, Beechwood Pl., to Dwight P. Robinson & Co., Inc., 215 East 46th St., New York. Est. $150,000 or more.

N. J., North Bergen—J. Ninivaggi, 1297 2nd Ave., Woodside, general contract 3 story, basement, brick, steel, 1299-130 2nd Ave., to R. Rinaldi, 516 Robinson St. Est. $150,000.

N. J., North Bergen—R. Rinaldi, 516 Robinson St., 10 story, basement, brick, steel, Boulevard East, separate contracts. $350,000. E. Buehler, 1071 Boulevard East Woodcliffe, archt.

N. J., North Bergen — Cadel Constr. Co., W. Cadel, pres., 311 12th St., West New York, 4 story, basement, brick, steel, 5542 Hudson Blvd., separate contract. $150,000. M. Kraut, 3010 Hudson Blvd., Jersey City, archt.

N. Y., Flushing—Atlas Constr. Co., 26 Court St., Brooklyn, 6 story, apartment, Bowne Ave., day labor and separate contracts. $150,000. B. Braunstein, 163-18 Jamaica Ave., Jamaica, archt.

N. Y., Flushing—Robert Rose, Inc., 677 Bway., apartment, 190th St. and 37th Ave., separate contracts. $150,000. J. Unger, 93 main St., archt.

N. Y., Flushing—Island Housing Corp., 160-16 Jamaica Ave., Jamaica, apartment, Main St., 58th and 59th Aves., separate contracts. $225,000. Private plans.

N. Y., Hollis—A. Herbert, 5 Villard Ave., apartment, Ralph St. and Grand View Ave., separate contracts. $150,000. H. Brucker, 2424 Myrtle Ave., Evergreen, archt.

N. Y., Jamaica—W. B. Evans, 150-13 87th Ave., Jamaica, 6 story, 99 x 109 ft. Foster Ave. and Motts Rd., separate contracts. $185,000. M. Hirsh, c/o owner, archt.

N. Y., Jamaica—Inroot Associates, 110 West 47th St., New York, 6 story, 100 x 146 ft., Union Turnpike and Austin St., separate contracts. $250,000. B. R. Swartburg, 2 West 46th St., New York, archt.

N. Y., Laurelton—Laurelton Homes, 160-16 Jamaica Ave., Jamaica, apartment, 224th St. and 131st Ave., separate contracts. $180,000. A. Allen, 163-18 Jamaica Ave., archt.

N. Y., Long Island City—Maple Constr. Co., 3067 44th St., 6 story, 130 x 160 ft., Maple Ave. and Frame Pl., separate contracts. $400,000.

N. Y., Long Island City—United Associates Homes, 89-31 161st St., Jamaica, apartment, 73rd Ave. and 89th St., separate contracts. $150,000. A. Allen, 163-18 Jamaica Ave., Jamaica, archt.

N. Y., Middle Village—J. Seiz, 66-70 78th St., 4 story, 80 x 100 ft. 66th Dr. and 78th St., separated contracts. $150,000. D. Levinson, 163-18 Jamaica Ave., Jamaica, archt.

N. Y., New York—Altoz Realty Corp., N. Filardi, pres., 74 Woodcrest Ave., White Plains, 6 story, basement, 84 x 125 ft., Tremont and Van Nest Aves., separate contracts. $200,000. M. W. Del Gaudio, 545 5th Ave., archt.

N. Y., New York—S. Besner, 1854 Harrison Ave., 6 story, basement, brick, steel, Popham Ave. and 176th St., to Bestmack Builders, Inc., 1854 Harrison Ave. Est. $150,000.

N. Y., New York—S and Z Eng. Corp., 1070 Anderson Ave., 6 story, 61 x 75 ft., Ogden Ave. and 165th St., separate contracts. $150,000. C. Kreymborg, 2534 Marion Ave., archt.

N. Y., New York—H. Mandel, 10 East 40th St., 19 story, 19th St. and 7th Ave., separate contracts. $4,000,000. **Maturity late fall.** Farrar & Watmough, 10 East 40th St., archts. Also bids after September, separate contracts for apartment unit 19th St. and 7th Ave.

N. Y., New York—F. Meli, 1228 Grand Concourse, 6 story, 181st St. and Creston Ave., separate contracts. $150,000. C. B. Cali, 81 East 125th St., archt.

N. Y., New York—M. Shacknow, c/o J. L. Crausman, archt., 332 East 149th St., 6 story, 224th St. and White Plains Ave., separate contracts. $155,000.

N. Y., New York—Two Hundred Twenty-Third Street Realty Corp., 332 East 149th St., 5 story, basement, brick, steel, 223rd St. and Carpenter Ave., separate contracts. $150,000. J. L. Crausman, 332 East 149th St., archt.

N. Y., New York—I. Zwenig, 1070 Anderson Ave., 6 story, 76 x 84 ft., Nelson Ave. near 165th St., separate contracts. $150,000. C. Kreymborg, 2534 Marion Ave., archt.

N. Y., St. Albans—Queens County Associates, apartment, 205th St. and 116th Rd., separate contracts. $150,000. G. Crane, 8711 114th St., Richmond Hill, archt.

N. Y., Woodside—Apex Homes, 37040 82nd St., Jackson Heights, apartment, 63rd St. and Hicks Dr., separate contracts. $150,000. Private plans.

R. I., Providence—Pollack Realty Co., c/o H. Marshak, archt., 36 Exchange Pl., 3 story, 65 x 110 ft., brick, Byron and Pine St. $150,000. Owner builds.

Ont., Cobourg—P. Alexander, Arlington Hotel, general contract 4 story, basement, 62 x 200 ft., brick, stone, concrete, steel hotel, King St. E., to D. C. Kay, 18 Strathearn Blvd., Toronto. Est. $300,000.

CLUBS

PROPOSED WORK

N. J., Allendale — Women's Club, B. W. Griffiths, in charge, Brookside Ave., 2 story, basement, brick, steel club, plain found. $150,000. **Maturity probably soon.**

N. J., Bayonne—B.P.O.E. Bayonne Lodge, 39 West 34th St., altering and constructing 2 story, basement, brick, steel addition. $150,000. Architect not selected. **Maturity about June.** Noted May 29.

N. J., Englewood—Englewood Women's Club, R. Gambee, chn., 162 Booth Ave., revised sketches 3 story, basement, brick, steel club house, Lydecker St. $150,000. Noted Dec. 4.

N. J., Garfield — Farnham Democratic Club, 103 Farnham Ave., 2 story, basement, brick, steel club house, Farnham Ave. $150,000. **Maturity probably soon.**

N. J., Jersey City—Seventh Ward Democratic Club, J. Prout, pres., 119 Danforth Ave., sketches 3 story, basement, brick, steel, 119 Danforth Ave. $150,000.

N. J., Jersey City—J. F. Jackson, archt., 137 East 45th St., New York, rejected bids Apr. 13, 7 story, basement, 100 x 100 ft., brick, steel addition, Fairview Ave., for Y.M.C.A., 654 Bergen Ave., $300,000. Noted Apr. 16.

N. J., Ramsey—Fortitute Lodge, W. Schroeder, grand master, 2 story, basement, brick steel masonic hall, Lake St. and Franklin Turnpike. $150,000. **Maturity probably soon.**

N. Y., New York—Women's Natl. Republican Club, 6 East 37th St., club house. $700,000.

Pa., Johnstown—Masonic Temple Assn. soon takes bids selected list contractors, 3 story, basement, brick, steel club. $300,000. Noted Oct. 1.

BIDS ASKED

Md., Cockeysville—May 11, by W. W. Emmart, archt., Union Trust Bldg., Baltimore, 3 story, basement, 118 x 124 ft., brick, rubble stone, hollow tile masonic homes, near here, for Grand Lodge of Maryland, Charles St., Baltimore, Sandlass & Wieman, Charles and Mulberry Sts., Baltimore, engrs.

HOSPITALS

PROPOSED WORK

Calif., Altadena — Sisters of St. Joseph, Orange, plans by N. Ackerman, 102 West 4th St., Eureka, group rein.-con., steel hospital buildings. $750,000.

Me., Fairfield—State, Central Maine Sanatorium, R. A. Jewell, chn. trustees, patient's building hospital unit. $150,000. Architect not selected.

Mass., Monson—Commonwealth of Massachusetts, Dpt. Mental Diseases, infirmary at state hospital, $150,000; storehouse, incl. refrigerating system, $75,000. Architect not selected.

Mass., Northampton — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, male nurses' home at State Hospital. $150,000. Architect not selected.

N. J., Long Branch—E. C. Hazard Hospital, E. C. Hazard, pres., 81 Washington St., sketches by P. C. Reilly, probable archt., 111 5th Ave., New York, 10 story, basement, brick, steel, Washington Ave. and Dewey St. $1,000,000. Raising funds. Noted Mar. 19.

N. J., Newark—Bd. City Comrs., City Hall, bids in July, general contract 2 story, basement, 30x110 ft., brick, steel, ward and recreation wing, Ivy Hill Almshouse. $200,000. J. T. Simpson, 45 Walnut St., archt. Noted Apr. 23.

N. Y., Schenectady—Ellis Hospital, Nott St., 7 story, 45 x 150 ft., brick, rein.-con., plain found., Project in abeyance. **Maturity indefinite.** $750,000. Noted Aug. 7.

Ore., Pendleton — State, Salem, plans by Knighton & Howell, United States Natl. Bldg., Portland, and soon takes bids 4 story, basement, 43 x 164 ft., rein.-con. hospital, at State Hospital for Insane. $200,000.

Pa., Erie—Hamot Hospital, c/o J. L. Sheppard, 4 East 2nd St., sketches by Crow, Lewis & Wick, 200 5th Ave., New York, 2 story, basement, brick, tile addition, 4 East 2nd St.

Wis., Racine—St. Marys Hospital, c/o Mother Vita Superior, soon takes bids 6 story, attic basement, sub-basement, 150 x 230 ft., T shaped, rein.-con. brick, stone steel. V. J. Kluthe, 915 Syndicate Trust Bldg., St. Louis, Mo., archt.

BIDS ASKED

Mass., Belmont — McLean Hospital, F. H. Packard, supt., 175 Pleasant St., taking bids 3 story, basement, brick, stone nurses' home, concrete found., hospital grounds, Waverly Sect. $150,000. Wadsworth, Hubbard & Smith, 11 Beacon St., Boston, archts. Noted Apr. 16.

Mass., Boston—May 14 (extended date), by City, Hospital Dpt., 3 story, basement, brick limestone pediatric pavilion, children's building, concrete found., Harrison Ave. $325,000; heating and ventilating, $25,000; plumbing and electrical work, $25,000. J. H. Ritchie & Associates, 250 Stuart St., archts. Noted Oct. 30.

Mass., Boylston—May 15 (extended date), by Worcester Co., W. Goodale, chn., Court House, 1, 2 and 3 story, basement, brick, stone, concrete, steel hospital, sanatorium, nurses home, power house, service building, plain found., Boylston and West Boylston. Est. exceeds $150,000. Frost, Chamberlain & Edwards, 3900 Main St., Worcester, archts. Noted Apr. 30.

Wis., Sheboygan — May 12, by Schmidt, Garden & Ericksen, archts., 104 South Michigan Ave., 5 story, basement, brick, steel, rein.-con. hospital, for Sheboygan Memorial Hospital. $300,000.

CONTRACTS AWARDED

Conn., Hartford—Hartford Hospital, L. K. Sexton, 23-25 South Hudson St., 2 story, basement, 65 x 110 ft., brick, stone nurses' gymnasium and educational building, incl. swimming pool, to A. F. Peaslee, Inc., 15 Lewis St. Est. $150,000. Noted Apr. 30.

Mass., Roxbury (sta. Boston) — House of Good Samaritan, A. Cunningham, pres., 100 Arlington St., 2 story, basement, brick, limestone, granite hospital wing, plain found., to P. J. MacNaughton Co., 711 Boylston St., Boston. Est. $150,000. Noted Apr. 23.

N. Y., Dongan Hills—Dpt. Hospitals, Municipal Bldg., general contract Sea View Hospital, to Burr Bie Constr. Co., 557 East Fordham Rd., New York, $136,000; electrical work, to L. A. Feldman, 855 Flatbush Ave., Brooklyn, $11,148.

CHURCHES

PROPOSED WORK

Conn., Hartford—Beth Israel Congregation, I. Wise, chn., 810 Prospect St., plans by C. R. Greco, 11 Beacon St., Boston, Mass., and soon takes bids 2 story, basement, 62 x 158 ft. community house, and 100 x 100 ft. synagogue, both brick, stone, Farmington Ave. To exceed $150,000. Noted Mar. 12.

Conn., Middletown — Federated Church of Middlefield, Middletown, plans by Perry & Bishop, 17 Court St., New Britain, new church. $150,000.

Mass., Attleboro—St. John the Evangelist Roman Catholic Parish, J. M. Quinn, pastor, and Maginnis & Walsh, archts., Statler Bldg., Boston, soon lets contract 1 story, basement, irregular sized, brick, stone, plain found., North Main and Peck Sts. $200,000. Noted Jan. 29.

Mich., Grand Rapids—Second Congregational Church, plans by Robinson & Campau, 715 Michigan Trust Bldg., 2 story, basement, 85 x 150 ft., brick, steel, stone, concrete church, parish house, plain founds., Chesire Dr. $250,000.

N. Y., Perth Amboy—G. W. Brooks, archt., 216 Smith St., bids in July, general contract 2 story, basement, brick, steel convent, Mechanic St., for St. Mary's Roman Catholic Church, c/o architect. $250,000. Noted Mar. 26.

BIDS ASKED

La., New Orleans—May 10, by A. Bendernagle, archt., Whitney Bank Bldg., 3 story, 70 x 100 ft., rein.-con., brick, steel rectory, wood pile found., Louisiana Ave., for Louisiana Congregation of Holy Cross. $150,000.

N. J., Hawthorne — St. Anthony's Roman Catholic Church, W. E. Thompson, 286 Diamond Bridge Ave., taking bids general contract 1 story, basement, 70 x 125 ft., brick, steel church. $150,000. T. J. Folks, 488 East 23rd St., Paterson, archt. Noted Feb. 13 Daily.

N. J., Newark—Fanning & Shaw, archts., 49 Ward St., Paterson, bids about May 15, general contract 4 story, basement, 60 x 65 ft., brick, steel chancery building, 31 Mulberry St., for Roman Catholic Diocese, 22 Mulberry St. $150,000. Noted Mar. 19.

N. J., Paterson—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Paterson—J. S. Struyk, archt., 161 Prospect St., Passaic, 2 story, basement, brick, steel church addition, Haledon Ave., separate contracts, for Third Reformed Church, c/o architect. $150,000. Former bids rejected. Noted Apr. 9.

N. Y., New York—Forth Church of Christ Scientist, Fort Washington Ave. and 178th St., general contract church, to Skinner & Cook, 60 East 42nd St., New York. Est. $200,000. Noted Mar. 5.

Ont., Ottawa—J. J. O'Gorman, pastor Blessed Sacrament Parish, 193 4th Ave., brick, cut stone, rein.-con., plain found., to Ross-Meagher Ltd., Elgin St., $219,525. Noted Apr. 2.

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SCHOOLS

PROPOSED WORK

La., Charles City—Bd. Educ., Erwin Larson, secy., plans by Jacobson & Jacobson, 123 Grand St., Minneapolis, Minn., concrete, brick school. $250,000.

La., Houma—Terrebonne Parish School Bd., c/o superintendent, voted $160,000 brick, concrete elementary school building.

Mass., Brookline—Town, c/o Kilham, Hopkins & Greeley, archts., 4 Park St., Boston, sketches 2 story, basement, brick high school addition. $200,000. Noted Feb. 12.

Mass., Fitchburg—Commonwealth of Massachusetts, Dpt. Educ., Boston, sketches by Haynes & Mason, 280 Main St., 2 story, brick practical arts building at Normal School. $160,000. Noted Feb. 26.

Mass., Lawrence—City, Mayor's Office, City Hall, sketches by J. G. Morissette, 575A Essex St., Saunders School, 2 story, basement, brick, stone, plain found., Broadway. $150,000-$175,000.

Mass., Lawrence—City, Mayor's Office, City Hall, sketches by Ashton, Huntress & Alter, 477 Essex St., replacing old Park St. School with 2 story, basement, brick, stone school, plain found., Park, Saratoga and Bunker Hill Sts. $150,000-$200,000. Noted Jan. 8.

Mass., Lawrence—City, Mayor's Office, City Hall, sketches by Higgins & Collens, 316 Essex St., Storrow School, 2 story, basement, brick, stone, plain found., Storrow and Marston Sts. $150,000.

Mass., Malden (br. Boston) — City, W. A. Hastings, mayor, City Hall, in charge, sketches by C. F. Springall, 50 Park St., altering and constructing 2 story, basement, brick addition to Emerson Grade School. $150,000.

Mass., Northampton—Smith College, School Rd., science unit at college. $150,000 or more. Architect not selected.

Mass., Spencer—Town, Superintendent Schools, plans by Frost, Chamberlain & Edward, 390 Main St., Worcester, brick, steel high school addition, Main St. Est. $150,000. Noted Nov. 20.

Mass., Wakefield—Town, Bd. Selectmen, W. Blanchard, 2 story, basement, brick intermediate school, Main St. $350,000. Architect not selected. Noted Feb. 12.

Mass., Waltham—Commonwealth of Massachusetts, Dpt. Educ., Boston, rebuilding and constructing addition to library at Massachusetts Agricultural College. $175,000. Architect not selected.

Mass., Wilmington—Town, J. Hathaway, chn. School Com., sketches by E. I. Wilson, 109 State St., Boston, altering and constructing 2 story, basement, brick high school addition. $200,000. Noted Feb. 12.

Mass., Winthrop—Town, E. R. Clarke, supt. schools, Junior High School addition. $150,000. Architect not selected.

Mass., Worcester — City, Dpt. P. Buildings, City Hall, soon takes bids 2 story, basement, brick, stone school, Heard St. Frost, Chamberlain & Edwards, 390 Main St., archts. $150,000. Noted Jan. 22.

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, infirmary at State School. $150,000. Architect not selected.

N. H., Exeter—Phillips Exeter Academy, L. Perry, principal, revised plans by Cram & Ferguson, 248 Boylston St., Boston, Mass., college building, campus. $150,000 or more.

N. H., Exeter—St. Michael's Roman Catholic Parish, D. J. Cotter, pastor, sketches by J. O'Shaughnessy, 80 Boylston St., Boston, Mass., 2 story, basement elementary parochial school, Water St. $150,000.

N. J., Elizabeth—Bd. Educ., 417 South Broad St., revised sketches by H. B. Brady, Inc., 333 North Broad St., 2 story, basement, brick, steel, rein.-con. school, athletic field, Clarkson Ave. $300,000.

N. J., Long Branch—Bd. Educ. plans by H. I. Berg, 501 Harrison St., 2 story, basement, brick, steel addition, Bway. $150,000. Noted Mar. 26.

N. J., Madison — Drew University, A. A. Brown, in charge, college buildings, dormitories. To exceed $5,000,000. **Maturity early in 1933.**

N. J., Maywood—Joint Bd. Educ., Rochelle Park, Saddle River Twp. and Maywood Municipal Bldg., will not build Regional high school, $150,000 or more. Project abandoned. Noted Mar. 19.

N. J., Midland Park — Bd. Educ., 2 story, basement, brick, steel school. $150,000. **Maturity probably soon.**

N. J., Mount Bethel — Bd. Educ., Warren Twp., 2 story, basement, brick, steel, plain found. $150,000. **Maturity probably soon.**

N. J., Morristown—Bd. Educ., O. M. Goble, dist. clk., 50 Early St., 2 story, basement, brick, steel, Mill Sts. $150,000 **Maturity probably soon.**

N. J., Newark—Bd. Educ. City Hall, will not build Madison Ave. School, 3 story, basement, brick, steel. $150,000. Project abandoned. Noted Mar. 5.

N. J., Newton—Bd. Educ., High School, bids probably in November, Junior High School, 2 story, basement, brick, steel, rein-con. $150,000.

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Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted Nov. 27.

N. J., Phillipsburg—Bd. Educ. High School, Junior High School, 2 story, basement, brick, steel, Jersey and South Main Sts. $150,000. Project in abeyance. Architect not selected. Noted Apr. 9.

N. J., Rutherford—Owner, c/o T. J. Folks, archt., 488 East 23rd St., Paterson, sketches 2 story, basement, brick, steel parochial school, Ames Ave. and Chestnut St. $150,000. Architect not selected.

N. J., Sussex—Bd. Educ., J. E. Stickney, clk., will not build 2 story high school. $150,000. Project abandoned. Noted Apr. 16.

N. J. Union City—Bd. Educ., 415 32nd St., bids in September, 3 story, basement, 152 x 190 ft., brick, steel, West St. between 5th and 6th Sts. $750,000. J. Lagosch, 714 Bergenline Ave., archt. Noted Apr. 23.

N. J., West New York—Bd. Educ., L. V. Roth, pres., Municipal Bldg., School 3, 3 story, basement, brick, steel, 11th and Polk Sts. $150,000 or more. Project abandoned. Noted Mar. 12.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, Franklin K. Lane High School, incl. gymnasiums, swimming pool, science laboratories, wood working, machine, arts and crafts room, at Jamaica Ave. and 76th St. $3,000,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 170, 6th Ave. and 71st St. $280,000.

N. Y., Jamaica—Bd. Educ., 500 Park Ave., New York, plans by C. W. Martin, Flatbush Ave. extension and Concord St., Brooklyn, altering and constructing 3 story, 72 x 181 ft. addition to School 117, 84th Dr. and 143rd St. $338,000.

N. Y., Queens Village—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 33, 92nd Ave. and 222nd St. $280,000.

N. Y., St. George—Staten Island Academy, H. O'Connell, in charge, 70 Stuyesant Pl., 2 story, basement, brick, steel, Ocean View Terrace and Todt Hill Rd. $150,000. **Maturity probaly soon.** Architect not selected.

O., Bexley—Bd. Educ., J. W. L. Henney, clk., soon takes bids 3 story, basement, 157 x 345 ft. and 3 story, part basement, 65 x 178 ft. high school, 1 story, 31 x 178 ft. shop and cafeteria, 1 story, 75 x 125 ft. auditorium, 1 story, 95 x 82 ft. gymnasium, all brick, stone, concrete, Cassingham Rd. $345,000. Miller & Reeves, 308 East Broad St., Columbus, archts. Noted Nov. 6.

Okla., Chickasha—State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches rein.-con. brick dormitory for women, on campus at Oklahoma College for Women. $200,000 appropriated. Architect not selected.

Vt., Burlington—Mount St. Mary Academy, M. Alphonsus, soon lets contract 2 story, basement, brick, steel school, Mansfield Ave. $200,000. Gray & Heffernan, 175 High St., Boston, Mass., archts. Noted Apr. 23.

Wis., St. Francis—P. Brust, archt., 135 Wells St., Milwaukee, soon lets contract 3 story, basement, 200 x 260 ft., brick, concrete dormitory, South Kinnickinnic St., for Pio Nono College. Noted Feb. 26.

Wyo., Buffalo—Bd. Educ., M. H. Leitner, clk., high school. $175,000.

BIDS ASKED

Conn., Berlin—Town, Bd. Educ., taking bids altering and constructing 2 story, basement, brick addition to Junior High and Kensington Grammar School, plain found. $150,000. F. C. Teich, 99 West Main St., New Britain, archt.

Ind., Boone Grove—May 23, by School Comrs., for Township School, rein.-con., brick, stone. $150,000. J. Bruck, Kentland, archt.

Ind., Knightstown—May 15, by School Comrs., 2 story, basement, 75 x 100 ft., rein.-con., stone high school. $150,000. McGuire & Shook, K. of P. Bldg., Indianapolis, archts.

Ind., Laporte — May 16, by Bd. Trustees School City of Laporte, at High School Bldg., school. G. W. Allen & Son, 209 Savings Bank Bldg., Laporte, archts.

Kansas—May 11, by Clerk Bd. Educ. Wyandotte Co., at White Church School House, 2 story, basement, 153 x 248 ft. rural high school, on Leavenworth Rd., 1 mi. east of Bethel, for Bd. Educ., H. J. Perry, pres., R.F.D.4, Kansas City. $150,000.

Me., Charleston—Higgins Classical Institute, E. E. Herrick, pres. Bd. Trustees, and Crowell & Lancaster, archts., 6 State St., Bangor, taking bids 3 story, basement, 60 x 110 ft., brick school unit, plain found., institute grounds, $150,000; heating, plumbing and electrical work, $5,000. Noted Apr. 23.

Mo., St. Louis—May 12, by Bd. Educ., E. T. Friton, building comr., 911 Locust St., J. Gabriel Woerner School, 3 story, rein.-con., brick, stone, Bowen St. and Wilmington Ave. $380,000.

N. J., Clifton—May 14, by Bd. Educ., High School Bldg., School 3, 2 story, basement, brick, steel, 7th St. and Washington Ave. $250,000. Former bids rejected. Lee & Hewitt, 152 Market St., Paterson, archts. Noted Apr. 30.

N. J., Englewood—Bd. Educ., 11 Engle St., bids about July 1, 2 story, basement, brick, steel high school, Knickerbocker Rd. $850,000. L. C. Licht, 4 Dean St., archt. Noted Mar. 19.

N. M., Roswell—New Mexico Military Institute, H. B. Smyrl, secy.-treas., taking bids 2 story, brick, stone, rein.-con. barracks. $150,000.

N. Y., Albion—Bd. Educ., H. D. Bartlett, pres., bids about July 1, high school. $390,000. C. W. Clark, Cortland, archt. Noted Apr. 23.

N. D., Dickinson—May 15, by Dormitory Corp., Dickinson State Normal School, M. Klinefelter, secy., 3 story, basement girls' dormitory, rein.-con., brick, steel, State Normal School. $200,000. I. L. Bush, Minot, archt. Noted Feb. 19.

Pa., Pittsburgh — University of Pittsburgh, J. Weber, acting dean, Administration Bldg., taking preliminary bids 2 Pittsburgh contractors Heinz Chapel, stone, Cathedral Campus. $600,000. C. Z. Klauder, 1429 Walnut St., Phila., archt.

CONTRACTS AWARDED

Conn., Wallingford—Choate School, G. C. St. John, headmaster, 1 story, 160 x 375 ft., winter exercise building, brick, steel, owner builds, under supervision H. Stone, school constr. engr. $200,000. Polhemus & Coffin, 232 Madison Ave., New York, archts. Noted Apr. 16.

Conn., Willimantic—W. E. Sweeney, sub-con. on properties, general contract 2 story, basement, 65 x 95 ft., brick high school addition, incl. library, to Rowley Constr. Co., 260 Central Ave., Pawtucket, R. I., for Town, E. A. Case, supt. schools, $70,800. Noted Apr. 9.

Ind., South Bend—University of Notre Dame, 2 story, basement, 90 x 200 ft., rein.-con., brick college, to R. Sollitt & Sons, 518 East Sample St. Est. $200,000. Noted Apr. 23.

Ind., South Whitley—School Comrs., general contract brick, steel school, to W. O. Carey & Son, Huntington. Est. $150,000.

Ky., Louisville—Bd. Educ., 8th and Chestnut Sts., general contract Oakdale Elementary School, 3 story, irregular sized, rein.-con., brick, steel, to H. G. Whittenberg, 320 South 6th St., $215,000; heating and ventilating, to H. Netherton & Co., 114 North 5th St., $43,878. Noted Apr. 9.

La., Hahnville — St. Charles Parish School Bd., 13 new schools, to Caldwell Bros., 816 Howard Ave., New Orleans, $141,000. Noted Nov. 20.

Me., Gorham—State Normal School, W. E. Russell, principal, 1 and 2 story, basement, 60 x 180 ft., brick, stone gymnasium, auditorium, plain found., school grounds, to Googins & Clark, 46 Portland St., Portland. Est. $150,000. Noted Apr. 16.

Mass., Groton—Groton School, E. Peabody, headmaster, and D. H. Chandler, archt., 75 Newbury St., Boston, altering and constructing 1 and 2 story, basement, irregular sized additions to Brooks House, Hundred House and Dormitory, plain founds., school grounds, to E. F. Miner Building Co., 25 Foster St., Worcester. Est. $150,000 or more. Noted Apr. 16.

Minn., Mapleton—Bd. Educ., general contract 2 story, basement, 75 x 235 ft., brick, rein.-con., stone, to E. N. J. Constr. Co., Rochester, $77,950. Noted Apr. 9.

Mo., Joplin — Bd. Educ., general contract North Junior High School, 2 story, basement, brick, steel, rein.-con., to Buchanan & North, Fort Smith, Ark., $168,709; heating and plumbing, to H. B. Schulte, 514 Joplin St., $56,494; electrical work, to Chandelier Shop, 110 West 6th St., $10,995. Grand total $236,198. Noted Mar. 26.

N. J., Jersey City—Bd. Educ., Administration Bldg., general contract 5 story, basement, brick, steel gymnasium addition Dickinson High School, to Auf Der Heide Contg. Co., 534 Jackson St., West New York, $471,880. Noted Mar. 26.

O., Oakwood (br. Dayton)—Bd. Educ., Junior High School, 3 story, basement, brick, steel, concrete, to H. R. Blagg Co., 1229 East 3rd St., Dayton, $193,380. Noted Mar. 26.

Pa., Pittsburgh—Bd. Educ., H. W. Crambler, secy., Administration Bldg., general contract Prospect Elementary and Junior High School, 3 and 4 story, basement, 110 x 218 x 270 ft., T shaped, brick, steel, to Dick Constr. Co., 2532 Library Rd., $443,800; plumbing, to G. H. Soffel Co., 107 Carson St., $34,895; heating, to Moss & Blakeley, Beltzhoover Ave., $68,931; unit heaters, to Buckeye Blower Co., 61 South Bryant Ave., Bellevue, $8,930; boilers, to Titusville Iron Wks., Farmers Bank Bldg., $6,385; stokers, to Combustion Eng. Co., 1st Natl. Bank Bldg., $4,230; temperature regulation, to Johnson Serv. Co., 10 Diamond St., $6,080. Grand total $573,251. Noted Apr. 9.

Wash., Renton—Renton School Dist., Lyon Bldg., Seattle, 3 story, 118 x 241 ft., brick high school, to Dolph Jones, 2213 North Proctor St., Tacoma, $177,500. Noted Apr. 9 Daily.

Wis., Manitowoc—Bd. Educ., general contract Junior High School, 2 story, 104 x 280 ft., to Hoffman Constr. Co., 1519 North Oneida St., Appleton, $219,828; stone, to Volbrect Cut Stone Co., 753 South Canal St., Milwaukee; steel, to Manitowoc Ship Building Co., Manitowoc.

Wis., Whitefish Bay — Milwaukee Co. Day School, general contract 3 story, 132 x 222 ft., brick, stone, North Richards St., to Foster-Morris, 410 Oakland St., Milwaukee; sublet cut stone, to Andres Stone & Marble Co., 110 Keefe Ave.; reinforcing steel, to Kalman Steel Co., 110 East Wisconsin Ave.; sheet metal, to Seeger Sheet Metal & Furnace Wks., 655 3rd St.; excavation, to Froemming Bros., 1326 Humboldt Ave.

THEATRES

PROPOSED WORK

Calif., Santa Ana—O. Halsell plans by Walker & Eisen and C. A. Balch, assoc. archt., 1117 Western Pacific Bldg., Los Angeles, brick, concrete theatre, store, 5th St. and Bway. $150,000. United Artists Theatre of California Ltd., 931 South Bway., Los Angeles, lessee.

Pa., Lewisburg—Company to be organized plans by C. H. Tallman, Williamsport, N story, basement, 50 x 75 ft. theatre, hotel. $280,000.

BIDS ASKED

Calif., Whittier—D. S. Bushnell, archt., Warner Theater Bldg., taking bids 80 x 140 ft. Class A rein.-con. theater, 1,000 seating capacity, for A. Wardman, c/o architect. Noted Mar. 5.

Ont., Ottawa—D. J. Creighton, archt., 3641 Oxenden St., Montreal, Que., taking bids 3 story, basement, brick, steel, stone, concrete theatre, 1,600 seating capacity, Rideau St., for Triangle Amusement Co. Ltd., P. J. Nolan, pres., 263 Clemow Ave. Est. $300,000. Noted Mar. 26.

CONTRACTS AWARDED

Mass., Springfield—S. and N. Goldstein, 103 Bridge St., and Mowl & Rand, archts., 21 School St., Boston, 1 story, basement, brick, steel, marble, 80 x 125 ft., theatre, 1,200 seating capacity, to Geo. H. Reed & Co., Greenfield. Est. $150,000 for Goldstein Amusement Co., 167 State St. Noted Apr. 23.

BANKS

PROPOSED WORK

Conn., Middletown — Mechanics & Farmers Savings Bank, 189 Main St., brick, steel, stone addition. $150,000 or more. Architect not selected.

Mass., Malden (br. Boston) — Malden Co-operative Bank, L. Makepeace, pres., 20 Exchange St., brick, steel, co-operative bank. To exceed $150,000. Architect not selected.

N. J., Newark—S. D'Auria & Sons, 139 7th Ave., 2 story, basement, 50 x 105 ft., brick, steel bank, Clay and Broad Sts. $150,000. **Maturity in late summer.** A. S. Miller, 1774 Carroll St., Brooklyn, archt. Noted Mar. 19.

O., North Canton (br. Canton)—George D. Harter Bank, Market Ave., N. Canton, 2 story, basement bank, Main St. $150,000. Architect not selected.

BIDS ASKED

Mass., Roxbury (sta. Boston)—Grove Hall Savings Bank, 648 Warren St., taking bids 1 story, basement, brick, stone, concrete bank, plain found., Blue Hill Ave. and Georgia St. $150,000. Krokyn & Browne, 120 Milk St., Boston, archts.

N. J., Paterson—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Paterson—Bway. Bank & Trust Co., 120 Bway., 2 story, basement, 80 x 100 ft., brick, steel, rein.-con., Bway. and West Bway., separate contracts. $150,000. H. B. Crosby, and A. E. Sleight, 125 Ellison St., archts. Architects taking bids on steel. Noted Mar. 19.

O., Zanesville—First Natl. Bank, 6 story, basement, steel, Bedford limestone bank, office, to E. Mast & Sons Co., Zanesville. $250,000.

OFFICES

PROPOSED WORK

N. J., Hackensack—H. C. Harper & F. W. Bogart, 37 Huyler St., will not build 2 story basement office, 309 State St. $150,000. Project abandoned. Noted Feb. 26.

Pa., Pittsburgh—J. C. Reilly Estate, c/o C. Strong & A. D. Reid, Keystone Bldg., 8 and 10 story, brick, stone, incl. stores, parking garage, Oakland, 5th and Boquet Sts. $750,000.

BIDS ASKED

Conn., Hartford—May 15 (extended date), by Hartford Fire Insurance Co., 690 Asylum St., R. M. Bissell, pres., brick, steel office, Asylum St. To exceed $150,000. E. S. Dodge, 148 State St., Boston, Mass., archts. French & Hubbard, 210 South St., Boston, Mass., engr. Noted Apr. 30.

STORES

PROPOSED WORK

Ill., Chicago—A. S. Alschuler, archt., 28 East Jackson Blvd., soon takes bids 3 story, 100 x 100 ft., brick, face brick, terra cotta top addition, Jackson Blvd. and State St., for M. L. Rothschild, Jackson Blvd. and State St. $150,000.

N. J., Maplewood—E. J. Baker, c/o W. J. Fitzsimmons, archt., 626 Central Ave., East Orange, will not build 2 story, basement, brick, steel store, apartment, 91 Baker St. Project abandoned. Noted Apr. 23.

BIDS ASKED

N. J., Millburn—Seabright Corp. taking bids general contract 2 story, basement, brick, steel store, apartment, plain found., Main St. $150,000. W. E. Lehman, 972 Broad St., Newark, archt.

CONTRACTS AWARDED

Conn., Danbury — Hayman Realty Co., 46 White St., brick, steel store and office building, to E. & F. Constr. Co., 94 Wells St., Bridgeport. Est. $125,000-$150,000. Noted Apr. 16.

Conn., New Canaan — Village Impvt. Co., J. Carl, Railroad Ave., 2 story, 75 x 115 ft., brick, steel store and office building, Railroad Ave., to Turner Constr. Co., 420 Lexington Ave., New York. Est. $125,000-$150,000.

Minn., Minneapolis—Pere Marquette Building Co., McKnight Bldg., general contract 3 story, basement, rein.-con., brick, stone store, office, to Naugle-Leck, Inc., 518 Baker Arcade. Est. $300,000.

N. Y., Astoria—Goodrich Constr. Co., 2474 27th St., bids about June 1, separate contracts store, apartment, 25th Ave. and West 29th St. $200,000. M. Margolin, 215 Montague St., Brooklyn, archt.

O., Massillon—Albrecht & Wilhelm, archts., 1900 Euclid Bldg., Cleveland, 2 story, basement, brick, steel, concrete department store, to A. F. Wendling Co., Massillon, for Gensemer Bros., Inc., D. D. Gensemer, Massillon. Est. $200,000. Noted Apr. 16.

PUBLIC

PROPOSED WORK

Mass., Boston—POLICE STATION and ADMINISTRATION—See "Factories and Mills."

Mass., Norfolk — PRISON COLONY — Commonwealth of Massachusetts, Dpt. Correction, sketches by McLaughlin & Burr, 88 Tremont St., Boston, brick, state prison colony. $1,500,000. Noted Mar. 19 under "Hospitals."

Mass., Worcester—AUDITORIUM—City, Worcester Memorial Auditorium Comn., C. L. Allen, chn. building com., soon takes bids brick, steel, stone, Salisbury St. $2,000,000. L. W. Briggs & Co., 314 Main St., archt. F. C. Hirons, 40 East 49th St., New York, assoc. archt. Noted Mar. 19.

Mass., Worcester—CITY HALL—City, Building Dpt., City Hall, granite top additions to City Hall, Main St. To exceed $150,000. Architect not selected.

N. J., Bayonne—FIRE and POLICE ALARM—Bd. City Comrs., City Hall, will not build 2 story, basement, brick, steel, plain found. $150,000. Project abandoned. Noted Mar. 26.

N. J., Hackensack — ADMINISTRATION — Bergen Co., Court House, bids early in June, 6 story, basement, 200 x 400 ft. administration building, Main and Hudson Sts. $1,200,000. E. L. Tilton & W. F. Schwanewede, 420 Lexington Ave., New York, archts. Noted Apr. 9.

N. J., Irvington (br. Newark) — POLICE HEADQUARTERS — Bd. Town Comrs., Town Hall, 2 story, basement, brick, steel addition, Washington Ave. $150,000. Project in abeyance. G. F. Lederer, 2 Union Ave., archt. Noted Apr. 16.

N. J., Union—MUNICIPAL—Township Comn., Township Hall, sketches by F. A. Elsasser, archt., Morris Ave., 2 story, basement, brick, steel, Morris Ave. $150,000. Noted Apr. 30.

N. J., West Caldwell — BORO HALL — Bd. Boro Council, Boro Hall, will not build 2 story, basement, brick, steel. Project abandoned. Noted Jan. 30.

N. Y., New York—HEALTH CENTER—Dpt. Health, 505 Pearl St., bids early in June baby health center, 349 East 140th St. $150,000. K. M. Murchison, 101 Park Ave., archt. Noted Feb. 19.

Tenn., Huntington — COURT HOUSE — Bd. Comrs. Carroll Co. plans by Hart, Freeland & Roberts, Independent Life Bldg., Nashville, 2 story, basement, rein.-con., brick, Public Square. $150,000.

W. Va., Clarksburg—COURT HOUSE—Bd. Comrs. Harrison Co., plans by E. J. Wood & Son, Lowndes Bldg., Clarksburg, and Walker & Weeks, assoc. archts., 2341 Euclid Ave., Cleveland, O., 5 story, basement, concrete, steel, stone. $750,000.

BIDS ASKED

Kan., Independence—COURT HOUSE—May 25, by Clerk Montgomery Co., remodeling and constructing 2 story, basement, 66 x 68 ft. addition. $160,000. Cuthbert & Suehrk, Topeka State Bank Bldg., Topeka, archts. Noted Mar. 19.

N. J., Jersey City—HALL OF RECORDS—Bd. Freeholders Hudson Co., Court House, bids about June 1, 16 story, basement, 200 x 225 ft., brick, steel, rein.-con. building, adjoining court house. $2,000,000. J. T. Rowland, 30 Veterans Sq., archt. Noted Apr. 9.

N. Y., Kingston—ARMORY—May 29, by Adjutant General, Capitol, Albany, state armory for field artillery. Former bids rejected; adv. E.N.-R. May 7. Noted Mar. 5.

N. Y., Newburgh—ARMORY—May 29, by Adjutant General, Div. Military and Naval Affairs, Capitol, Albany, state armory for field artillery. Former bids rejected; adv. E.N.-R. May 7. Noted Mar. 5.

N. Y., New York—ART MUSEUM—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, bids about June 1, founds. and general contract 2 and 3 story, museum, Metropolitan Museum of Art, 5th Ave. from 80th to 84th Sts., $3,350,000. J. R. Pope, 542 5th Ave., archt. E. E. Seeley, 101 Park Ave., structural engr. Tenny & Ohmes, 101 Park Ave., mechanical engrs. Noted Mar. 12.

N. Y., Syracuse—ARMORY—May 17, by State Armory Bd., Albany, armory addition. $250,000 appropriated.

N. Y., Wallkill—PRISON—June 5, by Commissioner Correction, State Office Bldg., Albany, medium security prison; adv. E. N.-R. May 7. Noted Apr. 30.

CONTRACTS AWARDED

Mo., St. Louis—POLICE STATION, etc.—Bd. Police Comrs., general contract 2 story, basement, 112 x 134 ft., rein.-con., stone police station and garage, to Woermann Constr. Co., 3800 West Pine Blvd., $95,790; plumbing, to E. J. Fisher, 4134 Westminster St.; heating, to Guaranteed Heating & Eng. Co., 1620 Chestnut St., $7,083; electrical wiring, to E. O. Dorsch Electric Co., 1418 Pine St.; jail equipment to Pauly Jail Bldg. Co., 2215 Dekalb St.; oil burner, to Porter Oil Refining Co., 1435 Kentucky St., $1,165. Noted Apr. 9.

UNCLASSIFIED

PROPOSED WORK

Mo., Kansas City — BUILDERS MART — Builders Assn. of Kansas City, plans by C. A. Smith, 800 Finance Bldg., 30 story, basement, brick, stone, 9th and Delaney Sts. $6,000,000.

N. J., Hackensack—DANCE HALL, AMUSEMENT CENTER—Lakeside Estates, Inc., 210 Main St., 2 story, basement, brick, steel, Main St. $180,000. **Maturity probably soon.**

N. J., Hopatcong—EXCHANGE—New Jersey Bell Telephone Co., 540 Broad St., Newark, will not build 1 story, basement, brick, steel exchange $150,000. Project abandoned. Noted Apr. 16.

N. J., Newark — ORPHAN ASYLUM, etc. — Hebrew Benevolent Orphan Asylum Society, 534 Clinton Ave., 2 story, basement orphan asylum, old peoples home. $150,000. **Maturity indefinite.** Raising funds. Noted Apr. 2.

BIDS ASKED

Mass., Worcester—MUSEUM—May 12, by Bd. Trustees Worcester Art Museum, F. H. Dewey, Sr., pres., 3 story, basement, 110 x 150 ft., brick, stone addition, Salisbury St. $150,000 or more. W. T. Aldrich, 30 Newbury St., Boston, archt. Noted Apr. 2.

N. J., Jersey City—HOME—M. Kraut, archt., 3010 Hudson Blvd., taking bids general contract Jewish Home for Aged, 2 story, basement, 40 x 100 ft., brick, steel, Fowler and Van Nostrand Ave., for Hebrew Home for Aged, M. Hurwitz, chn., 161 Summit Ave. $150,000. Noted Apr. 16.

N. J., Newark—FARMERS MARKET—C. A. Horton, archt., 24 Commerce St., taking bids general contract 1 story, basement, brick, steel, plain found., 143 Joseph St. and 244 Cornelia St., for Newark Farmers Market, Inc., G. Hames, vice-pres., 1218 Broad St., Bloomfield. $150,000. Noted Mar. 19.

CONTRACTS AWARDED

Conn., Mystic—ART GALLERY—Mystic Art Assn., Inc., G. A. Thompson, 2 story, 45 x 65 ft. and 25 x 55 ft., brick, stone, to H. Wales Lines Co., 134 State St., Meriden. $150,000. Noted Apr. 23.

Ill., Chicago — WORLD'S FAIR — Chicago World's Fair 1933, R. C. Dawes, pres., 160 North La Salle St., general contract (44th unit) Century of Progress Building, 2½ story, mezzanine, U shaped, on 400 x 700 ft. site, 16th St. and Leif Eriksen Dr., to McLennan Constr. Co., 307 North Michigan Ave. $800,000. Work starts in a week or 10 days. Noted Apr. 2.

Mass., Lynn — EXCHANGE — New England Telephone & Telegraph Co., and Densmore, LeClear & Robbins, archts., Park Sq. Bldg., Boston, 4 story, basement, brick, limestone, granite, plain found., to Wm. T. Dunneen Constr. Co., Memorial Park. Est. $300,000. Noted Apr. 9.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Conn., Danbury — FACTORY — Paul Martin Hat Co., Inc., Grand St., plans by Fletcher-Thompson, Inc., 542 Fairfield Ave., Bridgeport, 2 story, brick, timber, Grand St. Project held up indefinitely.

Mass., Boston—PRINTING PLANT, etc.—City, Dpt. P. Buildings, new sketches by J. M. Gray & J. P. Hefferman, 175 High St., 2 and 3 story, basement, brick printing plant, administration building, police station with connecting tunnel, North and Richmond Sts. To exceed $300,000. Noted Apr. 9.

Mass., Foxboro—LAUNDRY—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, laundry at state hospital. $45,000. Architect not selected.

N. J., Carteret — PLANT — Amer. Mineral Spirts Co., 205 East 42nd St., New York, sketches 1 story, basement, brick petroleum product plant, tanks, Williams Clark Property. $40,000 or more.

N. J., Lodi—DYE PLANT SERVICE—C. V. R. Bogert, archt., 120 Main St., Hackensack, rejected bids 1 story, basement, brick, steel, Main St. and Arndt Pl., for United Piece Dye Wks., Nicholson St. $40,000. May abandon project. Noted Mar. 19.

N. J., Morristown—DAIRY—Bendora Farms, 18 Prospect St., will not build 2 story, basement dairy plant. $40,000. Project abandoned. Noted Mar. 5.

N. J., Nutley—FACTORY—G. Swan & Co., 500 Kingsland Rd., 1 story, basement, brick, steel, Kingsland Rd. $40,000. **Maturity probably soon.**

N. J., Rutherford—FACTORY—Owner, c/o F. Pirrone, archt., 104 Midland Ave., Garfield, sketches 2 story, basement, brick, steel addition. $40,000.

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Factories and Mills (Continued)

N. Y., Ridgewood (sta. Brooklyn)—BAKERY—Classen Sons, Inc., 2386 Silver St., plans by W. Fuhrer, c/o owner, 3 story, basement, 75 x 109 ft. bakery, garage. Hughes and 60th Sts. $50,000. Noted Feb. 26.

O., Sandusky—PACKING PLANT—Anders & Reimers, archts. and engrs., Columbia Bldg., Cleveland, soon lets contract 2 story, basement, brick, steel, concrete addition, for Waldock Packing Co., F. P. Waldock, pres. $50,000. Noted Apr. 2.

Pa., Pittsburgh—FACTORY—R. M. Reutti, archt., Whitfield Bldg., soon lets contract brick, steel, 5600 Butler St., for F. Tinker & Sons, 5649 Berlin Way. $40,000. Will probably purchsae new equipment for above factory.

R. I., East Providence (br. Providence) — FACTORY—Eveready Cleansers & Dyers, 205 Cranston St., Providence, rejected bids Mar. 28. 2 story, brick, concrete. $40,000. Will readvertise. A. O. Kurze, c/o owners, archt. Noted Mar. 26.

N. B., St. Johns — FERTILIZER PLANT — Canadian Industries Ltd., P. O. Box 1260, Montreal, Que., or c/o E. I. DuPont De Nemours & Co., Wilmington, Del., and 420 Lexington Ave., New York, fertilizer plant. To exceed $100,000.

Ont., Porcupine — MILL—Cansua Mining & Exploration Co., 50 ton mill.

BIDS ASKED

Calif., Orange — PRE-COOLING PLANT — Orange Mutual Citrus Assn., J. F. Snowden, pres., taking bids 2 story, basement, 85 x 135 ft., brick steel, rein.-con., Orange St. $80,000. J. G. Vrybaugh, 505 Burch St., Santa Ana, archt. Noted Mar. 5.

Calif., Salinas—VITAMIN PLANT—See "Contracts Awarded."

Calif., Concord — POULTRY PLANT — See "Contracts Awarded."

Me., Portland—BAKERY—John J. Nissen Baking Co., 59 Washington Ave., taking bids altering and constructing 2 story, brick addition. $40,000. McCormick Co., 121 South Negley Ave., Pittsburgh, Pa., engrs.

Neb., Columbus—ICE CREAM FACTORY—See "Contracts Awarded."

Neb., Norfolk — BOTTLING PLANT — See "Contracts Awarded."

N. J., Garfield — LAUNDRY PLANT — F. Sciortino & V. Lamendold, Main St., bids about June 15, general contract 1 story, brick, steel, Division Ave. $40,000. A. L. Vigliante, 40 Passaic St., archt. Noted Apr. 23.

N. J., Jersey City—ENGINE PLANT—See "Contracts Awarded."

N. J., Millburn—DRESS FACTORY—E. P. Bonnett, archt., 363 Bloomfield Ave., Montclair, bids about May 15 (from selected list of bidders), general contract 2 story, basement, 45 x 70 ft., brick, steel, concrete, for P. Masella, 40 Main St. $40,000. Noted Apr. 30.

N. J., Newark—WOODWORKING FACTORY—W. Snyder, archt., 790 Broad St., taking new bids general contract 3 story, basement, 50 x 100 ft., brick, steel, New York Ave., for J. C. Kohaut, Inc., 117 Green St., $40,000. Former bids rejected. Noted Apr. 2.

N. J., Newark—FACTORY—Unique Art Mfg. Co., 196 Waverly Ave., bids about June 1, general contract 2 story, basement brick, steel, rein.-con., Waverly Ave. $100,000. Shaw & Co., 24 Commerce St., archts. and engrs. Noted Apr. 23.

Tex., Mission—CITRUS PACKING PLANT—L. E. Snavely, Harlingen, taking bids 2 story, brick, concrete. $75,000. Private plans. Noted Apr. 2.

CONTRACTS AWARDED

Calif., Concord—POULTRY PLANT—Wickham-Havens, Inc., 1510 Franklin St. (1st unit) 20 timber, corrugated iron poultry buildings, day labor. $75,000. Total $350,000. Noted Apr. 24.

Calif., Salinas—VITAMIN PLANT—Letisine Vitamin Co., Inc., c/o C. Dickens, 4 Key Route Arcade, Oakland, 1 story, brick, day labor. $75,000.

Calif., San Francisco — CREAMERY — Challenge Creamery & Butter Co., 307 Montgomery St., 2 story (ultimately 4 story), concrete, 18th and York Sts., to Monson Bros., 475 6th St., $115,560.

Conn., Ansonia—PLANT—Amer. Brass Co., Grand and Meadows Sts., Waterbury, altering and constructing plant addition, Canal St., to Chas. Smith & Sons, Inc., 101 Water St., Derby. Est. $100,000.

Mass., Everett (br. Boston)—PLANT—New England Fuel & Transportation Co., 250 Stuart St., Boston, 3 plant unit additions, incl. machinery shed, conveyor belt house, coal bin, each 1 story, steel, concrete, concrete founds. and some spruce piling, to Koppers Constr. Co., Koppers Bldg., Pittsburgh, Pa.

Mass., Holyoke—ICE PLANT—Electro Ice Co., Commercial St., 1 story, brick, Commercial St., to P. J. Kennedy & Co. Inc., 326 Appleton St. Est. $40,000.

Mass., Peabody — FACTORY — Carr Leather Co., 111 Foster St., 5 story, 45 x 100 ft., brick, timber, to E. H. Porter Constr. Co., 15 Wallis St. Est. exceeds $40,000. Noted Apr. 23.

Neb., Columbus—ICE CREAM FACTORY—Harding Cream Co., W. R. Davis, mgr., 1 story, 66x121 ft., ice cream factory, incl. side loading docks, West End 12th St., day labor. $60,000.

Neb., Norfolk—BOTTLING PLANT—Graham Ice Cream Co., 1510 Jones St., Omaha, 4 story, basement, 40 x 80 ft., brick, concrete, steel, tile, day labor. $75,000.

N. J., Allwood—PLANT—Ballinger Co., engrs. and archts., 12 Chestnut St., Phila., Pa., altering and constructing 2 story, basement, brick, steel, plant addition, separate contracts, for American Colortype Co., 207 West 25th St., New York. $40,000. Taking bids on road for plant. Noted Mar. 19.

N. J., Jersey City—CHEMICAL PLANT—Mallinckrodt Chemical Wks., West Side Ave., general contract 1 story, 75x155 ft., brick, steel, to James Mitchell, Inc., 24 Journal Sq. Est. $40,000. Noted Feb. 26.

N. J., Jersey City—ENGINE PLANT—Montgomery Cylinder & Grinding Co., 678 Montgomery St., 1 story, basement, 68 x 100 ft. auto engine rebuilding plant, brick, steel, Allen St. and Tonnelle Ave., separate contracts, $40,000. Former bids rejected. O. L. Wutzdorff, 147 Summit Ave., Union City, archt. Noted Apr. 30.

N. J., Old Bridge—YEAST PLANT—Stone & Webster, engrs. and archts., 120 Bway., New York, masonry for 4 story, basement, 100 x 100 ft., rein.-con. brick, to Shore Constr. Co., 94 Christee St., Newark, for Anheuser-Busch Co., Inc., c/o architects. Noted Jan. 8, under "Contracts Awarded."

N. Y., Brooklyn—BREWERY STORAGE—F. and M. Schaefer Brewing Co., Kent Ave. and South 10th St., brewery storage, Kent Ave. and 10th St., to Waldemar Montensen, 103 Park Ave., New York. Est. $100,000. Bids on separate contracts about July 1.

Vt., Bellows Falls—MANUFACTURING, etc.—Vermont Newspaper Corp., W. E. Balknap, Bellows Falls, 1 story, brick, steel manufacturing, office and publishing building, plain found., to Louckes & Clark, 6 Ernest St., Wallingford, Conn. Est. $40,000. Noted Apr. 2.

Ont., Hamilton — DAIRY PLANT — Acme Farmers Dairy Co., Walmer Rd., 1 story, 60 x 150 ft., concrete, brick, to W. H. Yates Constr. Co., 17 Main St. E., $60,000. Noted Feb. 27.

GARAGES

PROPOSED WORK

Mass., Belchertown—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, service building addition at State School. $50,000. Architect not selected.

Mass., Watertown—D. A. Papalia, 129 Waverly St., 1 story, brick, rein.-con., steel garage, repair shop, concrete found., 117 Waverly Ave., $40,000. Private plans.

N. Y., Edgemere—A. Mayes, Reid Lane, plans by J. Unger, 93 Main St., Flushing, 1 story, 100 x 100 ft. service garage. $40,000.

N. Y., Hollis—Police Dpt., 240 Center St., New York, plans by T. E. O'Brien, 240 Center St., New York, 1 story, 50 x 200 ft. garage and service building, 222nd St. and 92nd Rd. $55,000.

BIDS ASKED

Pa., Oil City—Empire Oil Wks., W. J. Scott, in charge, Reno, taking bids 1 story, 30 x 40 ft. and 40 x 120 ft. brick, stone, terra cotta super-service station, garage and accessory building, State and 2nd Sts. Brenots & Hicks, Traymore Bldg., archts.

CONTRACTS AWARDED

Minn., St. Paul—First Natl. Bank, E. A. Taylor, dir., general contract, 8 story, basement, 100 x 130 ft., rein.-con., terra cotta garage, bank, to P. Steenberg Constr. Co., 914 Builders Exc. Est. $350,000. Noted Apr. 23.

N. Y., Long Island City — Sanitary Comn., Municipal Bldg., New York, general contract garage, to Siltuk Constr. Co., 5 Skillman Pl., $91,900; plumbing, to G. C. McLaughlin, $8,592; heating, to Murphy & Beaumont, 303 West 42nd St., New York, $9,400. Grand total $109,892. Noted Feb. 19.

SHOPS AND FOUNDRIES

PROPOSED WORK

O., Cleveland—MACHINE and STORAGE—H. M. Morse & Co., archts., 1750 Prospect Ave., soon lets contract 1 and 2 story, 120 x 156 ft., brick, steel, concrete, machine and storage plant, 2801 St. Clair Ave., for Strong, Carlisle & Hammond, L. J. Hammond, pres., 1394 West 3rd St. $75,000.

N. Y., Ridgeway (sta. White Plains)—SHOP—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Longmeadow — SHOP — Town, F. E. Smith, town clk., 1 story, 50 x 125 ft., and 40 x 40 ft., brick, cast stone municipal work shop, to G. F. Owens, 67 Brunswick St., Springfield. Est. $40,000. Noted Apr. 9.

N. Y., Ridgeway (sta. White Plains)—SHOP—Bucklers Constr. Co., 162 East Post Rd., White Plains, contractors shop and office, day labor. To exceed $40,000. **Maturity latter part May.**

POWER PLANTS

PROPOSED WORK

Illinois, Nebraska, Kansas and Oklahoma—North Amer. Light & Power Co., 231 South La Salle St., Chicago, Ill., power plants in Illinois, Nebraska, Kansas and Oklahoma. $15,000,000.

Ia., Sioux City—Iowa Pub. Serv. Co., c/o W. J. Bertke, pres., power plant to house 13,000 hp. turbo-generator, also remodeling present plant, Riverside Ave. $1,300,000.

La., Oakdale—City, concrete, brick light and power plant. $90,000 bond issue approved. F. P. Joseph, Glenmora, engr. Noted Mar. 12.

Mass., Vineyard Haven—Cape & Vineyard Electric Co., Vineyard Haven, sketches brick, steel, concrete power plant addition, Beach St. $40,000 or more. Private plans.

Mo., St. Charles—City, W. S. Neal, mayor, sketches municipal light and power plant, distribution system. $200,000-$400,000.

BIDS ASKED

Conn., Bristol—See "Contracts Awarded."

Ind., Indianapolis — May 15, at office C. C. Shipp, 230 East Ohio St., Flat Rock Hydro-Electric Plant 1, incl. 238 ft. concrete dam, 147 ft. spillway, 20 ft. high, rein.-con. power house, tainter gate house, designing 850 ft. retaining wall. Schaeffer & Gift, 208 Castle Hall, designing engrs.

N. Y., New York—May 12, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing 10th Street Sub-station for Rapid Transit R.R.

CONTRACTS AWARDED

Conn., Bristol—Connecticut Light & Power Co., W. W. Foreman, Leavenworth St., Waterbury, 1 story, brick, steel, steam regenerating plant, Riverside Ave., day labor. $40,000. H. A. Hayden, 175 Main St., archt. Noted Apr. 30.

Conn., New Haven—New Haven Gas Co., 80 Crown St., 1 story, 30 x 45 ft., brick, steel, concrete compressor house, 347 Chapel St., to United Engineers & Constructors, Inc., 112 North Broad St., Phila., Pa. Est. $40,000, incl. equipment.

WAREHOUSES

PROPOSED WORK

Ill., East St. Louis—Illinois R. R. Co., 135 East 11th Pl., Chicago, A. F. Blaess, ch. engr., soon takes bids 1 and 2 story, 100 x 800 ft., rein.-con., brick freight depot, Front St. $300,000. D. F. McLaughlin, c/o owner, archt. F. R. Judd, 700 Dowie Bldg., Chicago, engr.

Pa., Pittsburgh—Pennsylvania R.R. Co., J. N. Baker, 1118 Pennsylvania Sta., soon lets contract wrecking 40 x 55 ft. building, constructing 25 x 100 ft. garage, enlarging 1 story, 40 x 300 ft. building into 2 story building, 11th and Pike Sts. W. D. Wiggin, Union Sta., ch. engr. (Central Region). C. Koch & Co., 101 Ferry St., lessee.

BIDS ASKED

Calif., Los Angeles—Walker & Eisen, archts., Pacific Bldg., taking bids 2 story, 85 x 400 ft., heavy mill construction warehouse, East 15th St., for Baun Corp., 363 New High St.

Calif., San Francisco — See "Contracts Awarded."

N. J., Jersey City—May 12, by New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, 2 story, brick, steel freight house. $150,000.

N. J., Wanaque—May 14, by North Jersey Dist. Water Supply Comn., 24 Commerce St., Newark, 1 story, basement, 37 x 85 ft., brick, steel, rein.-con. store house, traveling crane, concrete paving, at Wanaque Headworks. $40,000. Private plans.

N. Y., New York—B. H. Whinston, archt. 6 East 46th St., bids about May 15, general contract altering storage and stores, 649 Lexington Ave., for Randick Realty Co., I. Koch, pres., 206 Lexington Ave. $150,000.

Pa., Washington—Bloch Bros. Tobacco Co., S. P. Morrow, in charge, 4030 Water St., Wheeling, W. Va., soon takes bids 1 story, 88 x 460 ft. tile, steel, rein.-con., Canton Twp. Private plans.

CONTRACTS AWARDED

Calif., San Francisco—Pacific Gas & Electric Co., 245 Market St., Class A rein.-con. substation, Broderick St. near Ellis St., day labor. $90,000.

D. C., Wash.—Thomas Sommerville Co., warehouse, office, to Skinker & Garrett, 1719 I St. N. W. Est. $80,000.

N. Y., Buffalo—G. S. Rider, archt., Marshall Bldg., Cleveland, O., general contract 3 story, 100 x 140 ft., rein.-con. warehouse, to J. W. Cowper, Rand Bldg., for Granger & Co., 135 Scott St. $100,000. Noted Apr. 23.

N. Y., Buffalo — G. S. Rider Co., archts., Marshall Bldg., Cleveland, O., 2 story, basement, 150 x 160 ft. rein.-con. warehouse, Bailey and Clinton Sts., to J. W. Cowper Co., Rand Bldg., for S. M. Flickenger, 79 Perry St. Est. $100,000. Noted Apr. 23.

Tex., Ft. Worth—Texas & Pacific Ry. Co., E. F. Mitchell, ch. engr., Dallas, 2 story, 81 x 219 ft., brick, steel, rein.-con. baggage, express and commissary building, to P. O'B. Montgomery, Constr. Industrial Bldg., Dallas. Est. $170,000.

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See proposal advertising on page 147